

Lake Pontchartrain Basin Foundation

Comprehensive Management Plan

Phase III

SAVE OUR LAKE

October 17, 1995

Funded by EPA Grant # X-006710-01-4





Acknowledgments

The Lake Pontchartrain Basin Foundation wishes to express its sincere appreciation to the legions of individuals who helped to develop Pontchartrain's Comprehensive Management Plan (CMP). These individuals include members of the CMP's Interagency Working Group and Advisory Group representing area universities; local, state, and federal agencies; elected officials; the business community; sportsmen's associations; civic associations; agricultural associations; commercial and recreational fishermen, and countless Pontchartrain Basin citizens.

In particular, we wish to note the assistance of the chairmen of the three technical committees whose reports are presented in this document:

Dr. Al Knecht, Sewage and Agricultural Runoff

Dr. Don Barbe' and Dr. Mike Barber, Stormwater Runoff

Mr. John Lopez, Saltwater Intrusion/Wetland Loss

These gentlemen and the members of their committees volunteered thousands of hours investigating and identifying Basin problems, formulating and evaluating solutions, and developing recommendations to address the identified problems. The assistance of the chairmen and the committee members has been invaluable.

We would also like to thank Mr. Myron Knudson, Mrs. Karen Young, and the EPA Region VI staff for their advice and timely assistance throughout the three phases of the Pontchartrain CMP process.

Thanks also to the entire Lake Pontchartrain Basin Foundation staff and Board of Directors for their input and assistance. Especially Ms. Charlene Gardebled, Mr. Clifford Kenwood and Mrs. Sheila Schayot for the innumerable revisions of draft documents they produced to get the CMP Phase III document in its final form.

Lastly but most significantly we wish to recognize the tireless efforts of Dr. Steve Gorin, Lake Pontchartrain Basin Foundation Program Director. Under Dr. Gorin's guidance, the CMP process was conceived, initiated, and is currently being finalized. Dr. Gorin's foresight, his expertise in planning, engineering, and management; and his diplomacy and tact assured the Pontchartrain's CMP would be a professional, nationally accepted, implementable restoration plan which was completed within budget and in a timely manner. Truly, Dr. Gorin is the father of Pontchartrain's Comprehensive Management Plan.

Carlton Dufrechou
Executive Director

EXECUTIVE SUMMARY

Lake Pontchartrain Basin Foundation

Comprehensive Management Plan

Phase III

This document constitutes the third and final phase of the Lake Pontchartrain Basin Comprehensive Management Planning process. It presents three reports developed by technical specialists to address major environmental challenges in the Basin: sewage and agricultural runoff; stormwater runoff; and saltwater intrusion/wetland loss. Specific projects recommended by the specialists are listed in the individual reports. The recommendations of the Lake Pontchartrain Basin Foundation are listed in the final section.

I. SEWAGE AND AGRICULTURAL RUNOFF REPORT

Sewage and agricultural runoff are major sources of pollution in the Basin. Elevated fecal coliform bacteria levels have led to restrictions on basin waterbodies. Potential sources of high bacteria counts in these waterbodies include: community sewage treatment plants, stormwater runoff from urbanized areas, sewage by-passes, broken sewer lines, dairies and cattle farms, and wildlife.

Management options or solutions to sewage and agricultural runoff contamination problems must be addressed individually. Solutions to problems in the north section of the Basin will be different from those in the south section because of the differing sources of pollution. **Agricultural runoff** from dairy cows, cattle, and horses must be managed on a site by site basis. In many cases, ponds can be constructed to collect the runoff and to provide some degree of treatment before being discharged. **Individual home systems** are generally a problem due to lack of maintenance, mechanical failures or poor design. Maintenance and homeowner education are the keys to effective operation of individual home systems. Another source of pollution related to the individual home system is disposal of septeate. Facilities should be developed to handle this type of waste.

Community systems often suffer from lack of maintenance or overload because the system was underdesigned for the population it now serves. The obvious solutions are proper design and

operation. Unfortunately, most of the communities or companies that operate these system are underfunded. There are some areas along the south shore where unsewered homes and camps discharge waste into Lake Pontchartrain or bayous. Proper planning at the parish level with emphasis on larger, more centralized systems is the best long term solution to the basin's sewage problems.

II. STORMWATER RUNOFF REPORT

Stormwater runoff, a form of non-point source (NPS) pollution, is the largest single source of pollution in Lake Pontchartrain. Stormwater runoff occurs when rainfall--which can scour litter, animal droppings, particulates, and other contaminants that have settled on the ground, roofs or paved areas and carry them into the drainage system--is pumped into Lake Pontchartrain. Major pollutants in stormwater include: sediments, nutrients, bacteria (pathogens), organics, metals, and pesticides.

Metropolitan New Orleans has an annual precipitation of approximately 60 inches. Since the city is below sea level and surrounded by a levee system, stormwater must be pumped into Lake Pontchartrain, the Mississippi River, the Intracoastal Waterway, or the Inner Harbor Navigation Canal to prevent flooding. The frequent need to pump out large quantities of stormwater in a relatively short period of time makes treatment extremely difficult.

Stormwater runoff is currently the major source of fecal coliform bacteria along the south shore of the Lake. Due to age and soil conditions, the municipal sewerage systems of Orleans and Jefferson parishes have developed countless breaks and failures resulting in infiltration and inflow problems throughout the area. During periods of heavy rain, many areas tend to flood and raw sewage mixes with the stormwater and ultimately enters the Lake. Additional water quality concerns from stormwater in Lake Pontchartrain include oil and grease, nutrients, and metals. Sediments, pesticides, and organic enrichment do not appear to be serious problems.

Recommendations for alleviating the problem of stormwater runoff are as varied as the problem. Stormwater system investigation and repairs are required throughout the south shore to eliminate line breaks, to locate cross-connections between sewerage and stormwater systems and to find illegal discharges to the stormwater system. The flow balancing method, a

method whereby a temporary holding "tank" is constructed to contain polluted stormwater for later treatment, should be investigated. **Stormwater Treatment** through wetlands could be an extremely effective method of cleansing stormwater. **Bioremediation**, the introduction of microorganisms to destroy pollutants, should be considered for use in drainage canals. **Public education and participation** programs are the most cost-effective method of reducing pollution from urban runoff and should be expanded.

Finally, **planning to reopen swimming areas**, is required. The south shore could be swimmable within five years. A master plan should be prepared for increased use of south shore swimming areas.

III. SALTWATER INTRUSION/WETLAND LOSS REPORT

Wetland loss and saltwater intrusion are major problems in the Basin. Saltwater intrusion and wetland loss are usually the result of a combination of natural and human-induced causes. Some of the natural causes are: subsidence, or "settling," of wetlands; sea level rise; the Mississippi River levee network; and natural abandonment of former deltas of the Mississippi. Human-induced causes include: canal construction; alterations to the natural surface hydrology; saltwater intrusion; shoreline erosion; and dredging. Human-induced causes appear to account for most of the loss experienced since 1932.

Altered Hydrology

The natural salinity balance in the basin has changed for four major reasons: 1) Mississippi River levees prevent the regular influx of freshwater and sediment into the basin's wetlands; 2) the Mississippi River-Gulf Outlet (MRGO) allows saline water to push further into the Basin; 3) subsidence, combined with sea level rise, allows saltwater into Basin wetlands; and 4) a network of dredged canals and channels also allow saltwater inflow.

Elevated salinity resulting from construction of the Mississippi River-Gulf Outlet (MRGO), destroyed all the swamp in St. Bernard Parish, caused the loss of over 4,000 acres of marsh, and converted over 30,000 acres of marsh to less productive saline type. The MRGO has also allowed saline waters into Lake Pontchartrain through the Industrial Canal, stressing wetlands around the

perimeter of the lake. Closing the MRGO is believed to be the best solution to the significant problems associated with the waterway. Container port facilities on the MRGO will have to be relocated to the Mississippi River. Until the MRGO is closed, dredged material from channel maintenance can be used to replenish nearby areas experiencing wetland loss.

Smaller projects designed to restore areas to a more natural hydrology have been proposed throughout the basin. Many of these projects take maximum advantage of existing water control methods/mechanisms and construction costs are relatively low. Each project should be evaluated on its individual merits.

Shoreline Erosion

Shoreline erosion is another cause of wetland loss in the basin. These losses are due to natural and man-induced factors. Some erosion is naturally occurring and part of the life cycle of a deltaic system. Ship traffic, particularly in the MRGO, is a major human-induced contributor to erosion. Several projects propose armoring eroding shorelines in the basin. These projects deserve high priority, but must be developed into a unified plan. Alternative approaches to simply placing rip-rap on the shoreline should be evaluated. Shorelines stabilized by armoring or rip-rap could be detrimental to SAV beds. Because of uncertain technology and possible detrimental effects, only project sites where erosion threatens "blowout" of marsh should be actively supported. Offshore structures, beach replenishment, and oyster reefs are alternative methods to combat shoreline erosion that should be evaluated.

Dredging

Loss from canal dredging accounted for approximately 16-17 percent of the total land loss in the basin since 1932. Most of this loss occurred prior to 1974. It is expected that the rate of loss from dredging will decrease.

Freshwater Diversions

Marshes in the basin experience subsidence rates of up to 3.2 feet per century. Since introduction of Mississippi River sediments has been virtually eliminated because of the levee system.

Marsh accretion is unable to keep pace with relative subsidence and sea level rise. The Mississippi River is now depositing most of its sediment load off of the continental shelf.

Diversion of nutrient and sediment-rich Mississippi River water could provide some of these sediments to wetlands. Multiple freshwater diversions have been proposed in the Lake Pontchartrain Basin. The proposed Bonnet Carre' diversion project is being reanalyzed, due to water quality concerns. Currently the Caernarvon Diversion is the subject of a \$100 million suit filed against the state by oyster fishermen due to closure of oyster beds from high fecal coliform counts. A broader plan for integrating diversions and other inter-related projects should be developed.

Management Plans

Current restoration efforts are designed to best manage many small projects whereas some portions of the Basin are in need of more general management plans. Proposed methods to address wetland loss or saltwater intrusion are often untested or have low predictability of success. Although these methods have potential positive outcomes in theory, very often complications arise due to implementation problems or degree of certainty of results. Management plans will have to balance these concerns with the long-term ecological health of the basin.

IV. CONCLUSION

The CMP process has developed a road map for the restoration of the Lake Pontchartrain Basin. Partnerships and alliances between the public and private sectors has led to implementation of many of our targeted goals and objectives. However, strategies to restore the Lake and Basin are constantly being shaped and reshaped by the intentions and commitments of those involved. These strategies are also tempered by social, economic, and political forces. Our restoration efforts must adapt to these forces. The success of the effort to restore the Lake Pontchartrain Basin is ultimately founded in the public's hard work and the confidence they place in the Lake Pontchartrain Basin Foundation.



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ACRONYM KEY

Though all acronyms are spelled out at their first usage, this list is provided for the convenience of readers.

CMP	Lake Pontchartrain Basin Comprehensive Management Plan
COE	U.S. Army Corps of Engineers
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
DEQ	Louisiana Department of Environmental Quality
DHH	Louisiana Department of Health and Hospitals
DWF	Louisiana Department of Wildlife & Fisheries
EPA	U.S. Environmental Protection Agency
GIWW	Gulf Intracoastal Waterway
IHNC	Inner Harbor Navigation Canal
LPBF	Lake Pontchartrain Basin Foundation
LCES	Louisiana Cooperative Extension Service
LSU	Louisiana State University
MRGO	Mississippi River-Gulf Outlet
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	National Resource Conservation Service (Formerly Soil Conservation Service)
NURP	National Urban Runoff Program
NWR	National Wildlife Refuge
S&WB	New Orleans Sewerage & Water Board
SAV	Submerged Aquatic Vegetation
SIWLC	Saltwater Intrusion & Wetland Loss Committee
UWMRC	University of New Orleans Urban Waste Management Research Center

INTRODUCTION

1.0 About this document

This document constitutes the third and final phase of the Lake Pontchartrain Basin Comprehensive Management Planning process. It presents three reports that provide recommendations and strategies to implement projects that address major environmental challenges in the Basin. The views and recommendations presented are those of the majority of the subcommittee members and reflect the makeup of the membership of the committees. These views may not necessarily be the same as those of all the diverse organizations and individuals participating in the planning process. Recognizing this diversity, the Lake Pontchartrain Basin Comprehensive Management Plan (CMP) attempts to balance the needs of the Basin's environmental resources with those who utilize these limited resources.

1.1 About the Lake Pontchartrain Basin Foundation

The Lake Pontchartrain Basin Foundation, a membership-based citizens' organization, is the public's independent voice dedicated to restoring and preserving the Lake Pontchartrain Basin. Through coordination of restoration activities, education, advocacy, monitoring of the regulatory process, and citizen action, the Lake Pontchartrain Basin Foundation works in partnership with all segments of the community to reclaim the waters of the Basin for this and future generations.

The Foundation, a non-profit citizens organization, was created by the Louisiana Legislature in 1989 to organize and coordinate the clean-up, restoration, and preservation of Lake Pontchartrain and the Pontchartrain Basin. The Foundation was formed in response to a consensus among concerned citizens that the Lake was being seriously degraded and irreversibly damaged by pollution and habitat destruction. Something had to be done to save it! The CMP will provide the "road map" to SAVE OUR LAKE.

Ten of the Foundation's 14 board members are elected from the Foundation's broad-based membership. The remaining four positions are filled by representatives of the Louisiana Departments of Environmental Quality, Health & Hospitals, Natural Resources, and Wildlife & Fisheries.

1.2 The Comprehensive Management Planning Process

Phase I

Phase I in the development of the Comprehensive Management Plan began with four public meetings in October, 1991. During the meetings, citizens were asked to give their opinions on the conditions and needs of the Pontchartrain Basin. Citizens' concerns, desires, goals and visions for the Basin's restoration and preservation were grouped into five categories: (1) Education/Outreach; (2) Renewable Resources; (3) Uses; (4) Pollution; and, (5) Institutional.

Phase II

Phase II began in March, 1992. Monthly workshops were held to develop alternatives addressing the five categories identified in Phase I. Two groups participated in the workshops: an Interagency Working Group made up of delegates from local, state, and federal agencies with regulatory authority in the Basin, and an Advisory Group made up of delegates from civic, business, university, farming, fishing, environmental, industrial, and other interested organizations. Five subcommittees corresponding to the five categories were created.

Five subcommittee reports were presented to the Interagency Working Group in July, 1992. Phase II synthesized these reports into four summary sections: (1) Plan Implementation; (2) Water Quality; (3) Essential Habitat; and (4) Education/Public Participation. Each section contains a series of goals, objectives, and action plans. The goals set the desired condition for the Basin. Objectives are specific, short-term targets for attaining the goals. Objectives are obtainable through the implementation of action plans established on the basis of preferred uses, standards, and permit activities in order to improve water quality and habitat. The final step in Phase II was to hold seven public meetings to describe the progress made on the plan to the public. The meetings began in June

1993. The meetings were held in: Metairie, Destrehan, Hammond, Mandeville, Amite, Chalmette, and New Orleans.

Several of the restoration alternatives identified in Phase II are presently being implemented. These projects include education and public awareness programs, animal waste retention lagoon construction and cleanout programs, a regional sludge disposal facility construction program, water quality monitoring and planning programs, seagrass restoration programs, and stormwater treatment programs. The CMP Phase II report is summarized in *Report to the People of the Lake Pontchartrain Basin*. The document also provides a summary of environmental problems in the Basin.

Phase III

This third and final phase, is a technical document addressing the Basin's major environmental challenges: Sewage and Agricultural Runoff, Stormwater Runoff, and Saltwater Intrusion/Wetland Loss. Committees of technical specialists were formed to investigate and recommend implementation of strategies and projects for each of the challenges. Each committee was assigned the following tasks:

1. **PROBLEM IDENTIFICATION** - investigate and identify specific problems associated with the challenge;
2. **RESPONSIBILITY** (Agencies/Groups) - determine agencies or groups with existing regulatory responsibility associated with identified problems and/or agencies or groups with abilities to implement solutions for identified problems; and
3. **ALTERNATIVE SOLUTIONS** (Projects/Managements) - formulate, evaluate, and recommend tentative projects and management practices to correct, resolve, or reduce the identified problems associated with each challenge.

The following three sections of this report detail the findings and recommendations developed by the committees. Each section was edited for uniformity of format, continuity, and the elimination of redundancy in the combined Phase III document.

Subcommittee Report:
SEWAGE AND AGRICULTURAL RUNOFF

Chairman: Al Knecht, Ph.D.

5/12/95

2.0 INTRODUCTION

Sewage and agricultural runoff represent major sources of pollution in the Lake Pontchartrain Basin. To facilitate management strategies for addressing the problem areas, the Basin was divided to northern and southern sections. The northern section of the Basin, often referred to as the Florida Parishes, is comprised of elevated pine forested uplands drained by rivers flowing into Lake Pontchartrain and Lake Maurepas. These rivers represent major recreational, residential, economic, and aesthetic resources, and are designated for "primary contact recreation" by the Louisiana Department of Environmental Quality (DEQ). Large sections of these rivers have been designated "natural and scenic rivers" by the Louisiana Department of Wildlife and Fisheries (DWF).

The southern section of the Basin extends east from the Mississippi River across a series of lakes to the Chandeleur Islands in the Gulf of Mexico. This section is primarily open water, wetlands, and marshes. It is also home to the City of New Orleans and the suburbs of the south shore.

While the entire Basin is home for approximately 1.9 million people, the majority of the population is located in this southern section. It is interesting to note that while the banks of the Mississippi River between New Orleans and Baton Rouge River are highly industrialized, industrial discharges from these facilities have a minimal impact on water quality within the Basin's boundaries.

The northern section of the Basin consists of a number of rivers which drain large upland areas either directly into Lake Pontchartrain or indirectly through Lake Maurepas. These rivers carry runoff water from timberland, farms, ranches, municipalities, wetlands and industries into the Lake and ultimately into the Gulf of Mexico. Before man entered the picture, the rivers carried natural

runoff containing soil, wild animal wastes and decaying organic matter from the forest and wetlands into the Lake. Now, these rivers carry increased soil, wastes and other contaminants from human and agricultural sources. The following is a brief description of the major rivers in the Basin, their hydrology, and their potential for becoming polluted from human activities.

Amite River

The Amite River originates in the State of Mississippi and flows southward along the boundary between East Feliciana and St. Helena Parishes of Louisiana. It continues along the common borders of East Baton Rouge, Livingston and Ascension Parishes and then breaks into distributaries in Livingston Parish, which empty into Lake Maurepas. River discharges range from a minimum of 248 cubic feet per second (cfs) to a maximum of 6,030 cfs with the average being 857 cfs. Major potential sources of pollution along the river include: runoff or drainage from septic tanks and agricultural activities; and sand and gravel mining.

Tickfaw River

The Tickfaw River originates in southern Mississippi and flows southward through St. Helena and Livingston Parishes, emptying into Lake Maurepas. River discharges range from a minimum of 106 cfs to a maximum of 390 cfs with the average being 213 cfs. Major potential sources of pollution along the river include: septic tanks and runoff from agricultural activities.

Tchefuncte River

The Tchefuncte River originates in the northeastern quadrant of the Florida Parishes and flows southward, through Washington and St. Tammany Parishes. The Tchefuncte merges with the Bogue Falaya River north of Covington, then flows into Lake Pontchartrain. River discharges range from a minimum of 31 cfs to a maximum of 190 cfs with the average being 77.7 cfs. Major potential sources of pollution along the river include: discharges from numerous small community and commercial sewage treatment plants; home septic and mechanical systems; runoff from dairy farms, cattle ranches, and nurseries; and construction sites.

Tangipahoa River

The Tangipahoa River originates in the State of Mississippi and flows southward through Tangipahoa Parish, emptying into Lake Pontchartrain. River discharges range from a minimum of 366 cfs to a maximum of 4,063 cfs with an average of 844 cfs. Major potential sources of pollution along the river include: discharges from unsewered or poorly sewerred municipalities; minor industries, including sand and gravel mining; unsewered rural residences and/or camps; and runoff from pasture land and dairy farms.

West Pearl River

The West Pearl River originates near the Pearl River Navigational Canal levee, draining much of the remote wooded marsh that surrounds it by way of Crier Slough, Wilson Slough, and Bradley Slough. Downstream, a succession of tributaries and distributaries flowing into and out of West Pearl River drain the surrounding intermediate submerged marsh. The West Pearl River ultimately empties into the Rigolets and Little Lake. Major potential sources of pollution include: runoff from unsewered or poorly sewerred areas; poorly maintained mechanical sewage systems and drainage from septic tanks.

2.1 PROBLEM IDENTIFICATION

Sewage and agricultural runoff represent the major sources of pollution in the Basin. For the purposes of this plan, pollution levels from sewage and agricultural runoff are measured by the presence of fecal coliform bacteria rather than Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS) or ammonia nitrogen. Fecal coliform bacteria are commonly used as indicators of pollution from human and animal wastes, and the possible presence of pathogens or disease causing organisms. Because the numbers of pathogenic organisms present in wastes and polluted waters are few and difficult to isolate and identify, the fecal coliform organisms, which are more numerous and easily tested for, are used as indicators. Unfortunately, members of the fecal coliform group are also common to all warm blooded animals. Some common soil bacteria also fall

into this group further complicating interpretation of the data, sometimes making it difficult to determine source of the organisms.

The DEQ and Louisiana Department of Health and Hospitals (DHH) currently use fecal coliform test results to classify water bodies for primary and secondary recreation activities. They are also able to use the test to determine the sources of sewage and animal waste pollution in the Basin by testing potential point sources.

TABLE 2.1

Location and Date of Restrictions	
<u>Location</u>	<u>Date of DEQ/DHH Advisory</u>
Lake Pontchartrain, south shore	1/1/82*
Mouth of Tchefuncte River	1/1/82
Tchefuncte River	2/4/91
Tangipahoa River	3/22/88
Bogue Falaya River	2/4/91
Bayou Bonfouca	11/24/87 (Creosote Spill)

* See comment, Appendix A, Letter 1

Fecal coliform bacteria are used by the DHH as a basis for restricting use of waters for recreational uses and shellfish farming and harvesting. At the present time, sections of three rivers on the north shore, and an area along the south shore of Lake Pontchartrain have restrictions due to high coliform counts. State regulations for primary contact recreation are based on a minimum of not less than 5 water samples taken over not more than a 30-day period with the fecal coliform content not exceeding a log mean of 200/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100 mL. If the mean exceeds this standard, an advisory is issued restricting primary contact recreational activities.

Areas of the Basin currently under DHH advisories restricting use for primary contact recreational purposes are identified in Figure 2.1. Table 2.1 gives the dates advisories were issued and the locations.

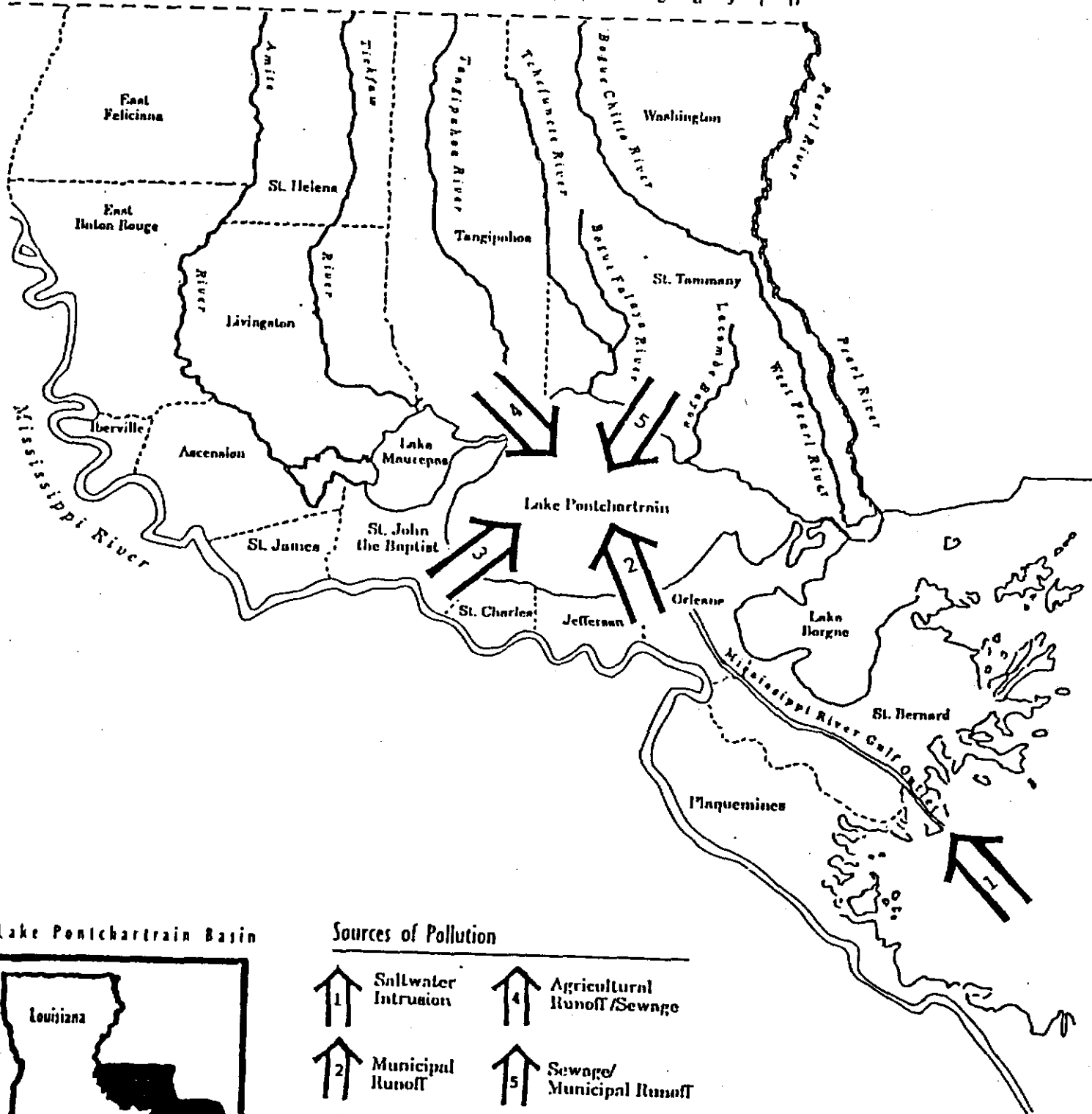
North Section of Basin

Fecal coliform bacteria responsible for the restrictions in this section of the Basin apparently enter the rivers from many sources, including:

- individual home systems,
- community and business systems,
- dairy and cattle farms, and
- wildlife.

Community and some business systems discharge directly into waterways. Individual home systems, dairy and cattle farms discharge to land or ditches which ultimately drain into the waterways. To further complicate the sewage problem, most of the soil in this section is not suitable for effective septic tank filter bed operation. As a result, many individual homes in rural and unsewered communities have installed septic tank systems that do not operate effectively and are poorly maintained. Also, some community systems in sewerred areas are overloaded and/or poorly maintained. A number of older communities on the north shore have collection systems of questionable integrity due to age, subsidence and inappropriate connections. Infiltration of these sewerage systems during periods of heavy rain exceed the capacity of lift stations and/or the sewage treatment plant and can thus result in the discharge of untreated or inadequately treated sewage into receiving waters. Broken sewer lines can cause raw sewage to enter stormwater systems or to drain directly into open ditches.

Lake Pontchartrain Basin



Lake Pontchartrain Basin

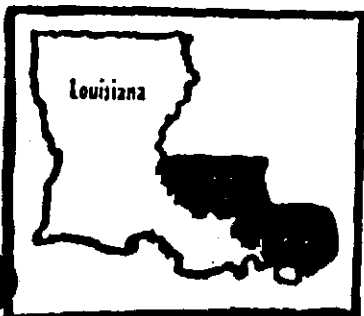


Figure 2.1 Advisory Areas

TABLE 2.2

**ESTIMATED NUMBER OF INDIVIDUAL HOME SYSTEMS AND COMMUNITY
SEWAGE TREATMENT SYSTEMS IN EACH PARISH**

Parish	Number of Individual Home Systems	Number of Community Systems
<u>North Section</u>		
Ascension	*	*
East Baton Rouge	**	2
East Feliciana	1,097	17
Iberville	*	*
Livingston	6,000	5
St. Tammany	13,300	300
Tangipahoa	6,787	222
Washington	<u>7,170</u>	<u>*</u>
Subtotal	34,354	548
<u>South Section</u>		
Jefferson (East Bank)	24	5
Orleans (East Bank)	1,100	1
St. Bernard	*	*
St. Charles	127	21
St. James	838	38
St. John the Baptist	<u>115</u>	<u>12</u>
Subtotal	2204	77
GRAND TOTAL	36,558	131

* Data not available.

** Small community systems in the parish have been tied into the central plants. However, there are still a number of homes in unsewered areas with individual home systems.

TABLE 2.3

ESTIMATED NUMBER OF CATTLE AND HORSES IN EACH PARISH

Parish	Population*	Cattle**	Dairy Cows**	Horses**
<u>North Section</u>				
Ascension	58,214	11,250	-	350
East Baton Rouge	380,105	11,500	1,382 (10)	1,330
East Feliciana	19,211	18,200	-	-
Iberville	31,049	6,250	-	267
Livingston	70,526	9,157	505 (6)	500
St. Helena	9,874	2,585	7,560 (72)	136
St. Tammany	144,508	6,500	630 (7)	1,250
Tangipahoa	85,709	7,000	30,500 (269)	270
Washington	<u>43,185</u>	<u>10,000</u>	<u>18,500 (186)</u>	<u>150</u>
Subtotal	842,381	82,442	59,077 (550)	4,253
<u>South Section</u>				
Jefferson (EB)	448,306	125	-	115
Orleans (EB)	496,938	-	-	385
Plaquemines (EB)	25,575	7,500	-	-
St. Bernard	66,631	550	-	50
St. Charles	42,437	3,200	-	750
St. James	20,879	418	-	159
St. John	<u>39,996</u>	<u>410</u>	<u>-</u>	<u>-</u>
Subtotal	1,140,762	12,203	-	1,459
GRAND TOTAL	1,983,143	94,645	59,077 (550)	5,712

*1990 Census

**1993 Louisiana Summary Agriculture & Natural Resources, Louisiana State University Agricultural Center

() Indicates number of dairy farms in parish.

The amount of contamination entering the waterways and ultimately the Lake is related to the number of potential sources of fecal coliform bacteria in each parish. Table 2.2 lists the estimated number of individual home and community systems in Basin parishes. Since the other major source of waste containing fecal coliform bacteria is from cattle and horses, an attempt was made to estimate the number of animals in each parish (Table 2.3).

A review of available fecal coliform bacteria data obtained on the major rivers in the northern section of the Basin indicates that the counts vary considerably during the year. Since the number of people and cattle remain relatively constant, researchers have investigated roles of seasonal and weather changes on fecal coliform bacteria levels.

The climate of the area is characterized by different precipitation/runoff mechanisms for the summer and winter seasons. Because of the combined effects of precipitation, evaporation, and transpiration, runoff is greater in the winter season. Studies by Higginbotham, et. al., 1991, Anderson, et. al., 1992, and Arunachalam, 1992, indicate that precipitation is a contributing factor on the Tickfaw and Tchefuncte Rivers. Higginbotham, et. al. 1991 and Arunachalam, 1992, found that fecal coliform counts are directly related to the high river discharge rates. While river discharge levels are related to precipitation events, precipitation data do not correlate strongly with fecal coliform levels in these rivers.

Arunachalam, 1992, showed that the correlation was strongest when the precipitation data were divided and analyzed on a seasonal basis. Discharge rates are higher in the winter season resulting in higher fecal coliform counts. Discharge rates are lower in the summer season with commensurate lower fecal coliform counts. It should be noted that the data used to impose restrictions on the rivers was obtained during the winter season and periods of high flow.

Because of the similarity of drainage areas, it is not unreasonable to assume that similar relationships exist between fecal coliform bacteria counts and Tangipahoa and Amite river flows. It should be noted that recent analysis of data on the Bogue Falaya River showed a strong correlation

between fecal coliform bacteria counts and precipitation (Gunta, 1990). The Bogue Falaya is a relatively small, shallow river and runoff represents a greater portion of the total volume of water than in the other larger and deeper rivers. Thus, the counts reflect the runoff which is virtually undiluted by the relatively small amount of river water. While these observations explain why the rivers have high fecal coliform counts, the source of the bacteria will depend on the specific area. It is possible that in some areas, runoff from dairy farms and ranches is the main source, while in other areas individual home systems may be the main source. The data in Table 2.3 shows that the parishes in the Basin have a population of about 1.9 million people and an animal population (cattle, dairy cows and horses) of approximately 159,434.

The North Shore has a population of 842,381 humans and a total of 145,772 farm animals. The sewage equivalent for each animal is equal to 15 humans (Anderson, et al., 1992), or a total population equivalent of 2,186,580. The total resulting sewage load is equivalent to 3 million people on the North Shore alone. More than two-thirds of this waste goes virtually untreated, and is discharged into the rivers as runoff during rain storms.

Animal wastes and effluent from septic tanks tend to accumulate on the land and in ditches during dry periods and are washed into the rivers by heavy rains. Effluent from septic tanks and small community systems continually drain into the rivers but it may take several days to get there during dry weather. Thus, their impact on water quality during dry periods does not appear to be a problem since the coliform counts in the rivers are low during these periods. However, it should be noted that the discharge of inadequately treated sewage into ditches could represent a significant local health hazard and should be reported to local authorities.

Animal wastes and to some extent septic tanks appear to be the primary source of coliform bacteria reaching the rivers during periods of heavy rain. Some community treatment systems are also contributors. Having identified the main sources of fecal coliform bacteria on the north shore, one can now direct attention to the responsible agencies, and address solutions to the problems.

It should be noted that using fecal coliform bacteria as the indicator of sewage and agricultural runoff, the other contaminants associated with these pollution sources are also present in relative concentrations. BOD, TSS and ammonia nitrogen levels should track the bacterial levels. Consequently, efforts to eliminate the bacteria will also reduce the amount of other pollutants entering the rivers and lakes.

South Section of Basin

The source of fecal coliform bacteria in this section of the Basin is primarily from community treatment plants, stormwater runoff from urbanized areas, sewage by-passes, and broken sewer lines. Individual home systems, cattle ranches and dairy farms are minor contributors. Since 1985, treated sewage from the large treatment plants on the East Bank of New Orleans and East Bank of Jefferson Parish have been discharged directly into the Mississippi River. These plants discharge treated or partially treated sewage into the drainage canal system during emergency situations due to excessive storm water infiltration. (See comment, Appendix A, Letter I.) Efforts are underway to reduce infiltration and to minimize the problem through special management options.

St. Charles Parish has 4 community systems which discharge into bayous and marshes that ultimately drain into the Lake. The other Parishes in the southern section of the Basin have both community and individual home systems which discharge into bayous and wetlands, and ultimately into the lakes. However, due to their relatively small populations, the impact on the Basin is not considered significant and is masked by the discharges from the Metropolitan New Orleans area.

Precipitation (60 inches per year or 12.9 billion cubic feet) in Orleans and Jefferson Parishes is collected in a series of canals and pumped into the Lake. In Orleans Parish alone there are over 170 miles of canals and 17 pumping stations with a combined capacity of over 20 billion gallons per day.

Stormwater collected in the system contains fecal coliform bacteria (Englande, 1994). Sections of the collection system in Orleans Parish were constructed in the late 1800s. Because of

the age of the system and subsidence problems in the area, stormwater can be contaminated with raw sewage. Also, there are undoubtedly numerous cross-connections which remain undetected. Jefferson Parish has similar problems even though the system is relatively new.

Jefferson Parish has made major improvements in the last 10 years with the construction of a new sewage treatment plant and improvements in the sewerage system. Several treatment plants that discharged poorly treated sewage into the drainage canal system for years were closed. Coliform counts in the Bonnabel canal have dropped from an average of 34,000/100 mL with a range of 50 - 720,000/100 mL, to 6,000/100 mL and a range of 100 - 33,000/100 mL after plant closure, based on data collected by the Parish between 1982 and 1989. These latter numbers are comparable to counts obtained on other canals not impacted directly by treatment plant discharges. It would appear that these levels represent the background contamination in the canals from various sources, including animal wastes (birds, nutria, and pets), illicit cross connections, broken sewage pipes due to subsidence, etc.

An analysis of historical fecal coliform bacteria data on Lake Pontchartrain, collected from 1982 to 1992, revealed a definite correlation between rainfall and fecal coliform bacteria counts (Seenappa, 1994). It has been suggested that this relationship could be used by the DHH to predict when the rivers and Lake are suitable for swimming. DHH has observed a similar relationship between fecal coliform bacteria counts and rainfall in their oyster bed monitoring program. Monitoring efforts initiated by the LPBF and DHH in 1994 will be analyzed to determine if there is a relationship between fecal coliform bacteria counts and rainfall in Lake Pontchartrain.

2.2 RESPONSIBILITY (Agencies/Groups)

DEQ and DHH share the major regulatory responsibilities for sewage treatment and management in the Basin. Some parish governments also have established administrative units and ordinances to manage sewage treatment at the local level, primarily individual home systems. State

regulations set discharge limits for community plants. Plants treating over 1 million gallons per day (gpd) are required to monitor on a daily basis and meet the following limits.

	<u>Daily Average</u>	<u>Monthly Average</u>
Total Suspended Solids (TSS)	15 mg/L	23 mg/L
Fecal Coliform Bacteria	200/100 mL	400/100 mL

Smaller community plants are required to meet these same limits in some areas but with less frequent sampling, annually in some cases. DEQ and DHH sample the smaller plants on a random basis. A number of plants within the Basin have been found to be in non-compliance and fined. (See comment, Appendix A, Letter 1.)

Community Systems

The main problem with many community systems is the lack of maintenance and inexperienced operators. In some cases, developers have installed treatment plants and have simply "walked away" from them, turning the systems over to homeowner associations. In most cases, DEQ has attempted to work with the associations and other system operators to improve operations. Usually funds are not available to make even minor repairs or to purchase needed equipment.

To address sewage problems in St. Tammany Parish, the State Legislature established the St. Tammany Environmental Services Commission. The Commission has developed ordinances covering community treatment plants and individual home systems. Community systems with design capacities greater than 10,000 gpd must meet the above limits. The objective is to require proper operation and maintenance of these systems.

Individual Home Systems

To prevent treated wastewater from leaving private property, St. Tammany Parish has also developed an ordinance requiring new installations of individual treatment systems on lots of 22,500 sq. ft or greater. Spray irrigation, oxidation ponds, rock filters, and evapotranspiration systems have been approved as alternatives to the required septic tank/absorption field systems.

Individual home systems are currently regulated by the DHH and the parish sanitarians are required to inspect installations and monitor operation. However, like most state agencies their resources are limited, thus they basically respond to complaints rather than monitor or inspect system operation. The Louisiana Cooperative Extension Service (LCES) has an active educational program on individual home systems. They have developed informational material which is widely distributed in unincorporated rural areas. (See comment, Appendix A, Letter 1.)

Agricultural Runoff

The LCES and the Natural Resources Conservation Service (NRCS - formerly the Soil Conservation Service) are currently implementing a plan to assist ranchers and dairy operators in controlling and treating runoff. Supplemental funding for this program was obtained with the assistance of the LPBF. While DEQ's non-point source section is responsible for managing runoff, their regulation for compliance has been minimal or non-existent. (See comment, Appendix A, Letter 1.)

Urban Runoff

DEQ's non-point source section is responsible for enforcing regulations on urban runoff. Large municipalities are required by the EPA to develop management plans and apply for storm water permits under the National Pollution Discharge Elimination System (NPDES). New Orleans and Jefferson Parish have submitted permit applications to EPA. Urban runoff is addressed in greater detail in the stormwater section of this report.

2.3 ALTERNATIVE SOLUTIONS (Projects/Managements)

Management options or solutions to the fecal coliform bacteria or sewage and agricultural runoff contamination problems must be addressed individually. Solutions to problems in the north section of the Basin will be different from those in the south section because of the sources of pollution.

North Section General

There are three basic sources of "sewage" pollution in the north section of the Basin, agricultural runoff, individual home systems and community systems.

Agricultural runoff from dairy cows, cattle, and horses must be managed on a site by site basis. In many cases, ponds can be constructed to collect the runoff and to provide some degree of treatment before being discharged. In other situations, proper contouring of the land can minimize runoff, reduce soil erosion and provide some treatment for the removal of fecal coliform bacteria. The NRCS can provide the expertise to develop the best solution for each situation. Federal funds are available from the Consolidated Farm Service Administration (formerly ASCS), NRCS, and LPBF in the form of cost sharing and grants to assist the farmer.

Individual home systems are regulated by the DHH and are generally a problem due to lack of maintenance, mechanical failures or simply poor design. Also, some homeowners will turn off or disconnect the pump to their small mechanical systems to save money on electricity. Many of the systems are old and in need of repair or replacement. New parish ordinances will require upgrades to many of these systems if the property is sold or if the homeowner hires a contractor to repair the system. Maintenance is the key to the effective operation of individual home systems. The material provided by the LCES provides basic information on the operation and maintenance of these systems.

Another source of pollution related to the individual home system is disposal of septate removed by vacuum truck. In the past this waste was accepted at local sewage treatment plants. Most facilities will no longer accept this waste material. Parishes should develop facilities to handle this type of waste either by providing a special treatment plant or by employing controlled land application techniques. Tangipahoa Parish is now building a regional septic tank waste treatment facility in a cost share arrangement with LPBF. (See comment, Appendix A, Letter 1.)

Community systems are regulated by DEQ and must produce an effluent that meets standards defined in their permit. The problems associated with these systems are usually lack of maintenance or overload because the system was underdesigned for the population it now serves. Operation of the systems may also be a factor when inexperienced personnel are employed. The obvious solutions, therefore, are to properly design and operate the treatment plants with properly trained personnel. Unfortunately, most of the communities or companies that operate these system are underfunded.

Enforcement of existing regulations by parishes and DEQ should force compliance and elimination of the problem. However, in some cases new systems will have to be constructed. Proper planning at the parish level with emphasis on larger more centralized systems is the best long term solution. St. Tammany Parish, in a cost share arrangement with LPBF, is now developing a comprehensive water quality management plan and new ordinances to address widespread rapid growth problems. Construction cost for sewerage systems is the primary deterrent to more centralized systems.

South Section General

The sources of fecal coliform bacteria or sewage from the south section of the Basin are primarily related to urban runoff. Due to age and poor soil conditions, the municipal sewerage systems, of Orleans and Jefferson parishes, have developed countless breaks/failures resulting in infiltration and inflow problems throughout the area. There are some areas along the south shore where unsewered homes and camps discharge waste into Lake Pontchartrain or bayous. While these homes and camps represent a local health hazard, they do not represent a major source of pollution in the Lake. There are also areas of St. Bernard and Plaquemines utilizing individual home systems. During periods of heavy rain, many areas tend to flood and raw sewage mixes with the storm water and ultimately enters the Lake. Again, these are local health hazards but do not represent a major continuing source of contamination in the Lake.

Urban runoff is currently the major source of fecal coliform bacteria along the south shore of the Lake. The obvious solution to the problem is to find the sources of sewage and take the appropriate actions to eliminate the problem. Due to the age of the sewerage system in New Orleans, this is probably a long term project. In Jefferson Parish, similar problems exists and can be addressed with a dedicated effort. Due to subsidence problems, many of the failures are in the yards of home owners. Proper inspection and an effective educational program directed at the homeowner should correct this situation.

Several options are being considered for treating stormwater in Orleans and Jefferson parishes before it enters the Lake. The volumes of water to be treated could be large. See stormwater section of this report for additional detail.

EXISTING AND PROPOSED PROJECTS

Currently, a number of projects and programs have been started or are being considered to reduce sewage and agricultural runoff throughout the Basin.

North Shore Specific

- Tangipahoa Parish septic tank sludge treatment plant near Amite.
- Agricultural assistance program for dairy farmers and cattle ranches
- LCES septic tank education program.
- St. Tammany Environmental Services and University of New Orleans Urban Waste Management and Research Center (UWMRC), water quality testing laboratory for north shore.
- St. Tammany Environmental Services Commission, design and construction of gravity system for Reno Hills area (Mandeville).
- UWMRC project on modeling and monitoring non-point source pollution in Lake Pontchartrain from agricultural areas.
- UWMRC evaluation of individual home sewage system performance in old and new sections of St. Tammany Parish. A study of the Reno Hills would provide the basis for requesting a block

grant to design and construct a sewage collection system for the area. (See comment, Appendix A, Letter 1.)

South Shore Specific

- LPBF pilot St. Bernard natural wetlands system.
- Orleans Levee District wetlands treatment project, New Orleans East.
- LPBF Lake water monitoring program.
- City of New Orleans and Orleans Sewerage & Water Board's (S&WB) infiltration and inflow analysis of New Orleans Lakeview area.
- City of New Orleans and Orleans Sewerage & Water Board's (S&WB) infiltration and inflow elimination in New Orleans Lakeview area.
- Jefferson Parish project to repair cracks in municipal sewerage lines throughout east bank of parish.
- UWMRC project to evaluate procedures for detecting inappropriate discharges to stormwater drainage.
- UWMRC Lake Pontchartrain urban stormwater runoff treatment demonstration project.

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Subcommittee Report:
STORMWATER RUNOFF
Chairman: Donald E. Barbe', Ph.D.
5/12/95

3.0 INTRODUCTION

Non-point Source Pollution and Urban Runoff

Traditionally, most efforts to control water pollution focused on reducing direct point sources discharging into surface water bodies. Despite the intensive efforts to improve water quality via point source treatment methods, many water bodies still do not comply with several water quality standards. This realization prompted an investigation of other sources of pollution that cause deterioration of surface water quality. In 1989, the EPA identified non-point source (NPS) pollution as the major continuing cause of water quality deterioration in receiving bodies (see Table 3.1).

Several general characteristics distinguish NPS pollution when compared to point source pollution. The first is that non-point source discharges enter surface waters in a diffuse manner and at intermittent intervals typically related to rainfall events. Point source pollution generally enters the surface water through pipes or other elimination systems. Second, the NPS pollution arises over an extensive area of land and is in transit overland before it reaches the receiving water bodies. Third, NPS pollution is difficult or impossible to trace back to the point of origin. Point source pollution enters receiving water bodies at discrete, identifiable locations via direct transport routes, as mentioned above (Novotny and Chesters, 1981).

A 1986 EPA report indicates that for approximately two-thirds of impaired water bodies, NPS pollution is the cause for the depreciated conditions. A recent EPA (1990) report on NPS pollution states that NPS pollution affects 206,179 miles of rivers, 5,300,000 acres of lakes, and

5,800 square miles of estuaries. The primary non-point source is agricultural runoff, followed by urban runoff and construction runoff (see Table 3.2) (Bastian, 1986).

TABLE 3.1

ESTIMATES OF NATIONAL DISCHARGE FROM POINT AND NON-POINT
SOURCES, 1972, BEFORE FWPCA*

	5-Day BOD	TSS	TDS	TP	TN
<i>Point sources</i>					
Industrial	8,252	50,355	290,184	353	559
Municipal	5,800	6,000	31,847	101	1,111
Total Point Sources	14,052	56,355	322,031	454	1,670
Non-Point Sources	18,901	3,422,321	1,536,458	2,986	12,480
National Total	32,953	3,478,676	1,858,489	3,440	14,150
<i>Non-Point Sources as % of total discharges</i>	57%	98%	83%	87%	88%

*in millions of pounds per year
Freeman, 1990

Non-point sources of pollution encompass contaminated runoff from urban and agricultural areas, roadways, abandoned mines, and construction sites. The major NPS pollutants associated with surface water impairment include: sediments, nutrients, pathogens, organics, metals, and pesticides. Major NPS pollutants associated with a particular runoff are often indicative of the runoff sources. For example, lead, cadmium, and oil and gas related hydrocarbons are typical constituents of roadway runoff. While sediment, nutrients (fertilizer), and pesticides are common constituents of agricultural runoff.

TABLE 3.2

PRIMARY NON-POINT SOURCE IN IMPACTED WATERS

	Rivers	Lakes	Estuaries
Agriculture	64%	57%	19%
Urban Runoff	5%	12%	18%
Construction	2%	4%	--

Of particular interest for urban hydrology is the NPS pollution contributed by urban stormwater runoff. Because urban stormwater runoff includes runoff from residential, commercial, industrial, and, potentially, agricultural areas, its pollutant load can be very diverse. Mancini and Plummer (1986) delineate three primary characteristics of urban runoff. The first is the intermittent nature of the pollutant loadings. The loads are usually of a relatively short duration compared to the time separating the storm or loading events. The second characteristic is the variability within and between storm events. Such variability includes rainfall intensity and duration and the length of time since the previous storm event. The last primary characteristic of urban runoff is the comparatively high concentration of suspended solids in the discharges.

National Urban Runoff Program

In 1981 and 1982, the EPA conducted an extensive study of urban stormwater runoff quality. The National Urban Runoff Program (NURP) included data from 81 sites in 22 cities from across the country from more than 2300 different storm events. The EPA published the final report of its NURP investigations in 1983. In addition to analyzing the storm events, the final report discussed potential water quality standards violations and suggestions for best management practices for reducing the pollutant load in stormwater runoff (Stahre and Urbonas, 1993). Because of the vast number of pollutants identified in urban stormwater runoff, the EPA

chose a representative population of standard pollutants to characterize urban runoff constituents (see Table 3.3).

TABLE 3.3

STANDARD POLLUTANTS CHARACTERIZING URBAN RUNOFF

Total Suspended Solids	TSS
Biochemical Oxygen Demand	BOD
Chemical Oxygen Demand	COD
Total Phosphorus (as P)	TP
Soluble Phosphorus (as P)	SP
Total Kjeldahl Nitrogen (as N)	TKN
Nitrite (as N)	NO ₂
Nitrate (as N)	NO ₃
Total Copper	Cu
Total Lead	Pb
Total Zinc	Zn

The basis for selection of the standard pollutants was as follows:

The list includes pollutants of general interest which are usually examined in both point and non-point source studies and includes representatives of important categories of pollutants--namely, solids, oxygen consuming constituents, nutrients, and heavy metals (1983).

Stahre and Urbonas (1993) provide a generalization of the broad findings reported in the final NURP report. Of particular interest are that:

- 1) no clear geographic patterns were discovered for Event Mean Concentrations (EMCs) of standard pollutants;

- 2) no correlation was exhibited between EMCs and runoff volumes, thereby suggesting that the two are independent of each other;
- 3) land use categories were not statistically significant tools with which to predict differences in EMCs (see Table 3.4); and
- 4) runoff volume coefficient produced a logarithmic correlation to the total basin imperviousness.

TABLE 3.4

LAND USE CATEGORY MEDIAN EMCs FOR ALL NURP SITES

Pollutant	<u>EMC (mg/L)</u>			
	Residential	Mixed	Open/ Commercial	Nonurban
TSS	101.000	67.000	69.000	70.000
BOD	10.000	7.800	9.300	---
COD	73.000	65.000	57.000	40.000
TP	0.383	0.263	0.201	0.121
SP	0.143	0.056	0.080	0.026
TKN	1.900	1.290	1.180	0.965
NO ₂₊₃	0.736	0.558	0.572	0.543
Cu	0.033	0.027	0.029	---
Pb	0.144	0.114	0.104	0.030
Zn	0.135	0.154	0.226	0.195

EPA, 1983

Table 3.5 indicates that the median urban site EMCs exceeded the EPA (1985) water quality criteria for heavy metals for both copper and lead. The Criterion Maximum Concentration (CMC) for acute exposure to copper ranges from 0.0092 mg/L to 0.034 mg/L, depending on the hardness¹ of the water. The averaging period for the CMC is one hour, the

¹ The levels of multivalent cations, particularly magnesium and calcium, present in water determine the hardness. Hardness is expressed in mg/L as CaCO₃, where soft water contains < 50 mg/L; moderately hard water contains 50-150 mg/L; hard water contains 150-300 mg/L, and very hard water contains >300 mg/L (Tchobanoglous and Schroeder, 1987).

same exposure duration in a stormwater context. The CMC for acute exposure to lead ranges from 0.034 mg/L to 0.200 mg/L, again depending on the hardness of the water (EPA, 1983).

TABLE 3.5

STANDARD POLLUTANT CONCENTRATIONS IN URBAN RUNOFF

Pollutant	Site Median EMC --Urban (mg/L)	90th Percentile --Urban (mg/L)
TSS	100.000	300.000
BOD	9.000	15.000
COD	65.000	140.000
TP	0.330	0.700
SP	0.120	0.210
TKN	1.500	3.300
NO ₂₊₃	0.680	1.750
Cu	0.034	0.093
Pb	0.144	0.350
Zn	0.160	0.500

EPA, 1983

The chronic exposure criteria, Criteria Continuous Concentration (CCC), for copper ranges from 0.0065 mg/L to 0.021 mg/L, taking into consideration the hardness of the water. The averaging period for CCC measurements is four days, which is also the exposure duration in a stormwater context. The CCC for lead ranges from 0.0013 mg/L to 0.0077 mg/L, considering the hardness of the water.

3.1 PROBLEM IDENTIFICATION

Livingston (1989) describes three characteristics of pollutant types and amounts associated with urban runoff. They are:

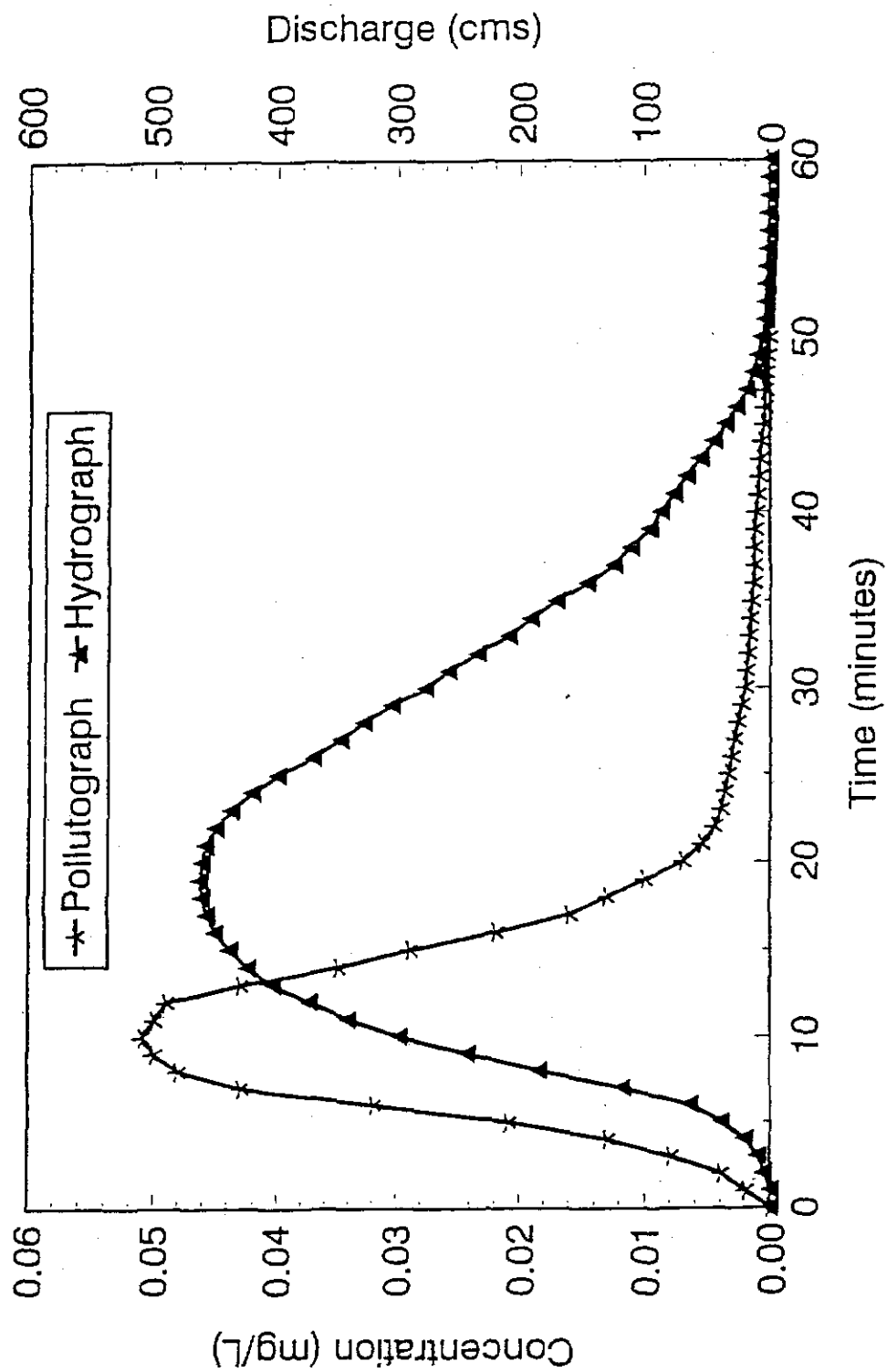
- 1) higher pollutant concentrations are associated with more intensive development and greater imperviousness;
- 2) construction erosion and sedimentation can result in high loadings of suspended solids; and
- 3) stormwater pollutant levels are comparable to secondary-treated wastewater effluent.

Mancini and Plummer (1986) also describe three types of water quality impacts associated with urban runoff. The first impact is distinguished by short-term changes in water quality during and just after storm events. One such change could be organism fatality due to the increase in toxins concentrations associated with storm events. The second impact is characterized by long-term changes in water quality. These changes can result from contaminants associated with suspended solids settling in the water body or from nutrients that enter a receiving body that has a long retention time. The last impact from urban runoff on water quality relates to scour and resuspension of sediment and associated pollutants. Resuspension essentially reintroduces the pollutants to the receiving body by removing them from a sink source.

During a storm event, high flows along impervious areas have a tendency to scour litter, animal droppings, particulates, and other contaminants that have settled during the preceding periods of low flows and velocities. The contaminants become resuspended and become part of the "first flush", the more polluted portion of the stormwater runoff flows and subsequent discharges. This "first flush" of stormwater can, upon discharging into the receiving water body, carry 90% of the pollutant load for the associated storm event (Miller, 1985).

Figure 3.1 depicts the concept of first flush. The concentration pollutograph exhibits a larger peak at an earlier onset as compared to the discharge hydrograph for the given storm event. In theory, if the first flush of the storm event could be diverted and subsequently treated before release into the receiving water body, the pollutant load on the receiving water would be greatly diminished.

Figure 3.1
Hypothetical Pollutograph/Hydrograph



3.2 RESPONSIBILITY: AGENCIES/GROUPS

Orleans Parish

The New Orleans Sewerage and Water Board (S&WB) and the City of New Orleans share responsibility for the drainage system in Orleans Parish. The Department of Streets of the City of New Orleans is responsible for the installation of all street subsurface drainage while the S&WB is responsible for the maintenance of all subsurface drainage and the maintenance and replacement of all lines 36 inches in diameter and larger. The S&WB is also responsible for the construction, operation and maintenance of all canals and pump stations. The Port Authority of New Orleans and the Orleans Levee District each own properties whose runoff enters the Orleans Parish drainage system.

Jefferson Parish

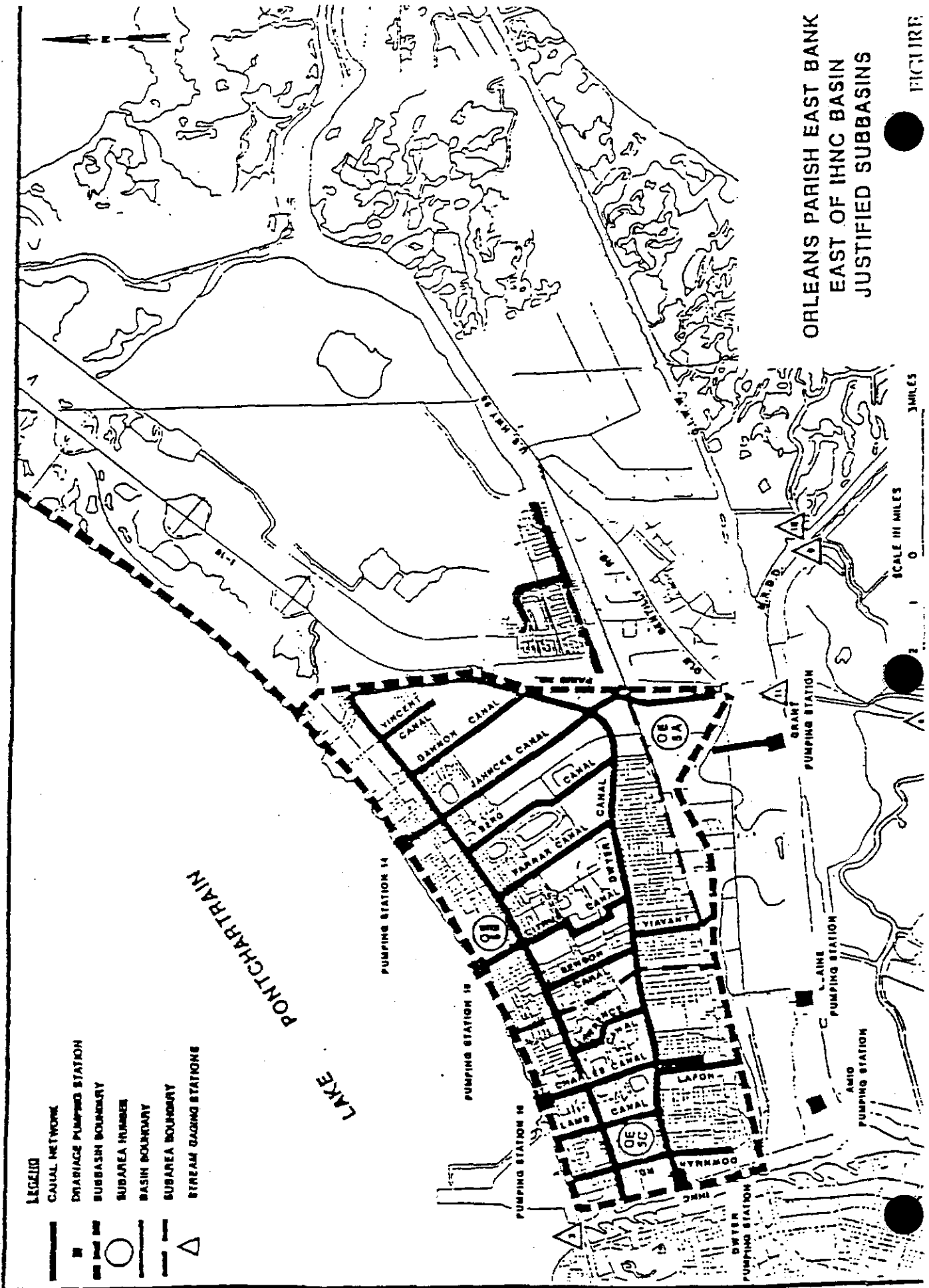
The Parish of Jefferson is the primary sponsor of the Stormwater Permit Application for Jefferson Parish and will be principally responsible for implementation of its management plan. The Department of Transportation and Development owns and operates the interstate roadway system that traverses both Orleans and Jefferson Parishes. The State of Louisiana, and the Department of Transportation and Development have joined both Jefferson and Orleans Parishes as co-permittee for their Stormwater Permit Applications.

Local Conditions

Metropolitan New Orleans has an annual precipitation of approximately 60 inches (see Table 3.6). The Orleans Parish drainage system, overseen by the S&WB, serves approximately 55,000 acres of industrial, commercial, and residential areas. Figure 3.2 outlines this drainage system which consists of a network of subsurface pipes, open and enclosed canals, and 21 major pumping stations (Army Corps of Engineers, 1992). This system stands in contrast to conventional drainage systems, which rely on gravity discharge.

Figure 3.2

Orleans Drainage System



ORLEANS PARISH EAST BANK
EAST OF IHNC BASIN
JUSTIFIED SUBBASINS

FIGURE

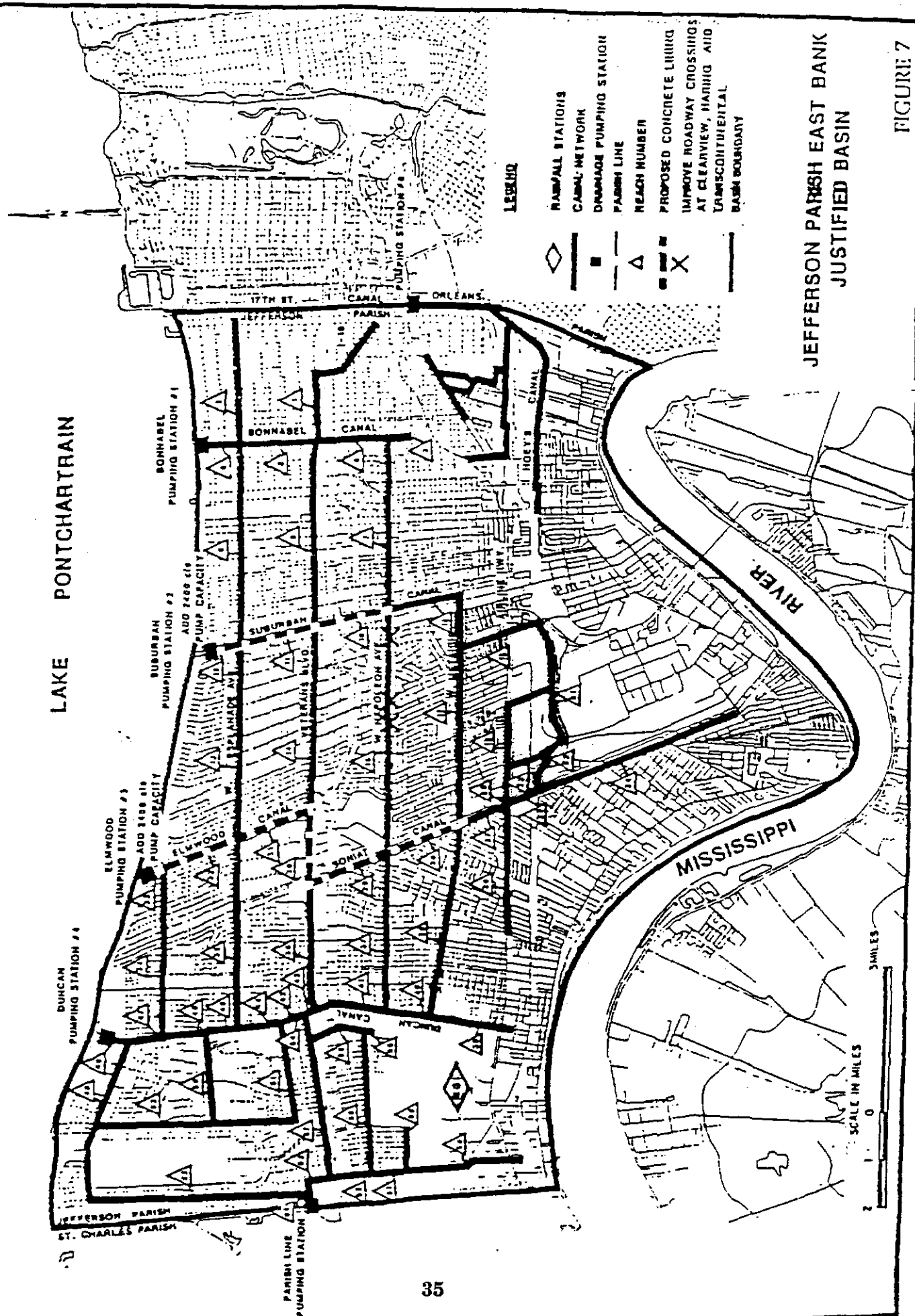
Table 3.6
Ten Year Precipitation Record
LPBF Comprehensive Management Plan - Phase III

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1984	4.10	5.27	4.90	1.72	3.54	7.21	3.86	9.51	3.79	2.84	2.80	2.53	52.07
1985	4.83	9.28	7.07	2.11	1.16	4.56	6.92	6.37	5.74	13.20	0.96	4.78	66.98
1986	3.49	2.93	1.88	1.50	1.61	8.87	3.60	6.74	1.42	2.87	7.90	5.05	47.86
1987	8.88	7.38	4.39	2.27	3.46	15.01	6.38	5.05	1.29	0.72	2.92	2.88	60.63
1988	3.74	11.31	8.90	9.25	1.68	11.28	6.78	7.53	5.86	2.87	1.26	3.94	74.40
1989	2.47	0.15	7.14	3.20	3.50	8.22	8.34	3.31	4.53	0.51	19.81	6.28	67.46
1990	7.59	11.45	5.98	4.59	5.87	1.01	2.30	2.45	4.55	2.38	3.21	9.67	61.05
1991	19.25	5.42	6.27	15.29	14.28	10.71	13.15	7.86	3.44	1.88	2.19	2.63	102.37
1992	9.94	8.73	6.69	2.52	0.95	9.52	5.75	9.64	6.63	0.55	15.27	5.68	81.87
1993	6.21	2.34	5.65	6.82	7.23	4.96	5.77	2.26	2.47	3.67		2.90	50.28
1994	3.25	0.54											3.79
Record													
Mean*	5.01	5.21	5.30	4.85	4.75	5.33	6.72	6.08	5.38	3.06	4.48	5.13	61.30

The pumping system is required for discharge because of the city's topography and levee system. The areas near the Mississippi River and Lake Pontchartrain are relatively high, approximately equal to sea level. The interior of the city is relatively low, approximately four feet below sea level. Additionally, the city is surrounded by hurricane protection levees. Therefore, to drain the city after a storm event, the water must be pumped from the interior over the levees to the Mississippi River, Lake Pontchartrain, the Gulf Intracoastal Waterway (GIWW), or the Inner Harbor Navigation Canal (IHNC).

The East Bank of Jefferson Parish has a drainage basin of approximately 30,710 acres. The Jefferson Parish drainage system consists of a network of subsurface culverts, ditches, canals, and pumping stations (see Figure 3.3). As with the Orleans Parish system, this system requires pumping to drain the storm water from the area, since most areas of Jefferson Parish have lower land elevations than the surrounding water surface elevations (COE, 1992). Pumping stations operate to maintain specific water surface elevations. When those elevation levels are exceeded, the pumps are engaged to discharge the surplus water into Lake Pontchartrain. (See comment, Appendix A, Letter 1.)

LAKE PONTCHARTRAIN



JEFFERSON PARISH EAST BANK
JUSTIFIED BASIN

FIGURE 7

Both Orleans and Jefferson Parishes have conducted storm event sampling and analysis of stormwater from outfalls into drainage canals for their Stormwater Permit Application. The results of this data collection show considerable variation in stormwater quality from site to site and from event to event at the same site. In general, the water quality results were similar to the standard National Urban Runoff Program (NURP) data. Fecal coliform counts were high in several samples indicating the presence of possible overflows, bypasses, inappropriate connections or cross connections to the sanitary sewer system. (See comment, Appendix A, Letter 3.) Total load projections were similar with NURP projections for BOD₅, COD, TKN, and total phosphorus. Load estimates for TSS and lead were significantly lower than NURP projections (Montgomery Watson, 1993).

Based on existing studies, data, and reports, fecal coliform (and attendant pathogens) is the primary constituent of concern. Secondary concerns include oil and grease, nutrients, and metals. Sediments, pesticides, and organic enrichment do not appear to be priority problems.

3.3 ALTERNATIVE SOLUTIONS (Projects/Managements)

- A. Application of the EPA's "User's Guide" for the elimination of inappropriate connections.

The Storm and combined Sewer Pollution Control Program of the Office of Research and Development, Environmental Protection Agency (EPA), and the NPDES Program Branch have supported the development of a User's Guide (Pitt, et al, 1992) for the investigation of inappropriate entries to storm drainage systems. The User's Guide (Pitt, et al, 1992) is designed to provide information and guidance to local agencies by meeting the following objectives:

1. Identify and describe the most common potential sources of inappropriate pollutant entries into storm drainage systems.

2. Describe a procedure that will allow a user to determine whether significant inappropriate pollutant entries are present in a storm drainage system, and then to identify the type of source, as an aid to the ultimate location of the source.

The User's Guide (Pitt, et al, 1992) was prepared in conjunction with a background study by Pitt and Lalor (EPA, 1983) which examined three categories of non-stormwater outfall discharges:

- pathogenic/toxicant,
- nuisance and aquatic life threatening, and
- clean water.

The most important category is outfall discharges containing pathogenic or toxic pollutants. The most likely sources for this category are sanitary or industrial wastewaters. The outfall analysis procedure described in the User's Guide (Pitt, et al, 1993) has a high probability of identifying all of the outfalls in this most critical category. High probabilities of detection of other contaminated outfalls are also likely when using the procedures. After identification of the contaminated outfalls, their associated drainage areas can then be subjected to a detailed source identification investigation. The identified pollutant sources can then be corrected (Barbe', et al, 1993).

B. Eliminate Infiltration/Inflow, Overflows and Bypasses.

Sewer system overflows and bypasses are a significant source of contamination of receiving waters. This source should be controlled by the expansion of programs that address the problem through major structural controls such as Infiltration/Inflow Abatement Programs, Overflow/Bypass Repair Programs, and Sewer System Capital Improvement Programs. Infiltration/Inflow Analysis and Abatement Programs such as currently undertaken by S&WB and the City of New Orleans and Jefferson Parish should be pursued.

C. Floating skimmers in channel to remove oil/grease and/or the Flow Balancing Method.

An innovative water quality improvement technology that might offer a much lower cost alternative is the flow balancing method. It has over ten years of successful application for stormwater pollution control on freshwater lakes.

The concept of the flow balancing method is to create a temporary holding "tank" for the polluted water within the receiving body of water at the outfall. The tank is formed by a chain of pontoons in the receiving body of water from which is hung a heavy curtain-like material to form the wall of the tank. The stormwater runoff flows into the tank and displaces the clean water that is normally in the tank. After the overflow event has stopped, the polluted water is pumped back to a waste water treatment plant for processing. The tank structure also functions as a natural capturing system for the floatables that are typically carried by the stormwater.

A modification of this technology to address the high flows and pollution problems in Lake Pontchartrain could be effective. The modification is a flow through system with disinfection capability to eliminate the fecal coliform problem in the Lake.

The possible advantages of system compared to other approaches are:

- Lower cost to construct
- Low operation and maintenance costs
- Flexibility
- Fast installation
- Little construction disruption at the site
- Removable, can be moved to another site if problem is solved by pollution prevention activities

D. Eliminate direct connection of roof drains to streets.

Roof drains (and other connections to the storm drainage system) should have a filter strip before connection to the storm drainage system. (See comment, Appendix A, Letter 1.)

A filter strip is a strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and waste water. Its purpose is to remove sediment and other pollutants from runoff or waste water by filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization before it enters natural watercourses or man-made channels so that water quality is not degraded.

E. Constructed Wetlands.

Wetlands act as a natural filter for many waterborne pollutants. Wetlands occurring at or near the mouths of rivers, bayous, and streams filter pollutants discharged from these watercourses. Constructing manmade wetlands at the mouths of pumping station discharge canals should be considered for increased filtration.

F. Stormwater Treatment/Diversions.

Diverting stormwater to treatment facilities and subsequent discharge to waterbodies or wetlands more readily able to assimilate pollutants should be considered. Jefferson Parish has undertaken a project to divert a portion of the Parish's east bank stormwater from discharge into Lake Pontchartrain to the Parish's Elmwood treatment facility. After treatment the stormwater will be discharged into the Mississippi River.

G. Bioremediation.

Bioremediation is the introduction of an artificially generated microorganism into a system to destroy a pollutant. Once the pollutant is destroyed (consumed) by the microorganisms, the microorganisms naturally expire. Bioremediation should be considered for introduction into Orleans and Jefferson Parish drainage canals as a means to reduce pollution (particularly pathogens) in urban stormwater.

H. Education.

Public education and public participation programs that increase awareness of existing programs and ordinances and solicit support of the public are important tools for the

management and reduction of stormwater runoff pollution. Stormwater education programs currently underway in Orleans and Jefferson Parishes have increased the public's awareness of the value of source controls. These education programs are the most cost effective method to reduce pollution from urban runoff. The programs should be continued and expanded to other Pontchartrain Basin Parishes. (See comment, Appendix A, Letter 1.)

I. Program/Planning to Reopen Historic Lake Swimming Areas.

Recent water quality samples indicate that Lake Pontchartrain's health is improving. With implementation of additional water quality improvement projects and programs, the Lake's south shore could be swimmable within the next five years. In order to reopen the south shore to swimming, a site specific testing and monitoring program should be developed and implemented with DHH. The testing and monitoring program should use DHH criteria for primary contact recreation.

As the Lake's health improves, so will the public's use of the Lake. Significant increased usage will likely result along the densely populated south shore. Existing lakefront facilities may not be adequate to accommodate increased usage. A master plan should be prepared for the anticipated increased use of the south shore. The master plan should identify and address: specific public uses of the Lake, possible sites for facilities (both existing and new), improved access, and possible impacts both to the Lake and surrounding areas. The master plan should be developed with the public, the City of New Orleans, Jefferson Parish, local agencies, and area universities. (See comment, Appendix A, Letter 1.)

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Subcommittee Report:
SALTWATER INTRUSION/WETLAND LOSS

Chairman: John A. Lopez, MSc.

5/12/95

4.0 INTRODUCTION

Saltwater intrusion and wetland loss are intimately related problems and for that reason were addressed together. It is widely accepted that both wetland loss and saltwater intrusion are both occurring within the Basin. Wetland loss has recently been well documented for current and historical rates. This work was completed by one of our committee members, Del Britsch, from the Corps of Engineers (COE). COE unpublished maps of wetland loss were integral to this analysis. In contrast, documentation of saltwater intrusion is less complete and more complex in assessing its impact. Saltwater intrusion information was only used in the general sense of the committee's experience or inferences made from hydrologic principles. Generally, it was assumed that higher salinities have exacerbated the wetland loss in the Basin. However, it was not assumed that the sole means to reduce wetland loss was by reduction of salinities.

It was also recognized by the Saltwater Intrusion and Wetlands Loss Committee (SIWLC) that developed this report that there are at least four intractable causes for salt water intrusion and wetland loss. These intractable causes are:

- subsidence
- sea level rise
- Mississippi River levee network
- natural deltaic abandonment

These causes serve as important reality checks since in some places in the Basin these causes may be so overwhelming that there can be no significant remediation to wetland loss or saltwater intrusion.

Many proposed methods to address wetland loss or saltwater intrusion are untested or at least have low predictability of success. A final major variable is the wetland itself. Because of the great variety of settings in a complex estuarine system, even identical projects could have dramatically different results in different sites within the Basin. In the final analysis, it can be said that all projects are in effect pilot projects and must be evaluated individually. For this reason the SIWLC has not taken general positions on particular types of projects, such as diversions versus hydrologic barriers. Instead we have sub-divided the Basin and attempted to evaluate the local system and the likely results of a particular project to that portion of the Basin. The "value added" of a potential project was weighed against not only the impact on the Basin but also with respect to the Basin users.

To simplify saltwater intrusion and wetland loss investigations the Pontchartrain Basin was divided into three sub-basins (Figure 4.1). The sub-basins are:

- A. Upper/Middle Basin - Lake Pontchartrain & Lake Maurepas system (Figs. 4.2, 4.3)
- B. Lower Basin: Biloxi Marsh, Lake Borgne, Mississippi & Chandeleur Sounds (Fig. 4.4)
- C. Breton Basin - Mississippi River delta (Figs. 4.5, 4.6)

The sub-basin boundaries only differ from the Comprehensive Wetlands Planning, Protection, and Restoration Act (CWPPRA) basin boundaries at the land bridge between Lake Pontchartrain and Borgne where the land bridge is split along Highway 90. (See comment, Appendix A, Letter 1.)

4.1 PROBLEM IDENTIFICATION

The primary sources of information for developing problem statements varied somewhat for the different sub-basins. Past CMP documentation was used for the Upper/Middle Sub-Basin (Emmer, R.E., 1992). A video recording of a public meeting addressing the MRGO was used for the Lower Basin (Harker, 1993). In all the sub-basins, COE unpublished wetland loss maps and statistics

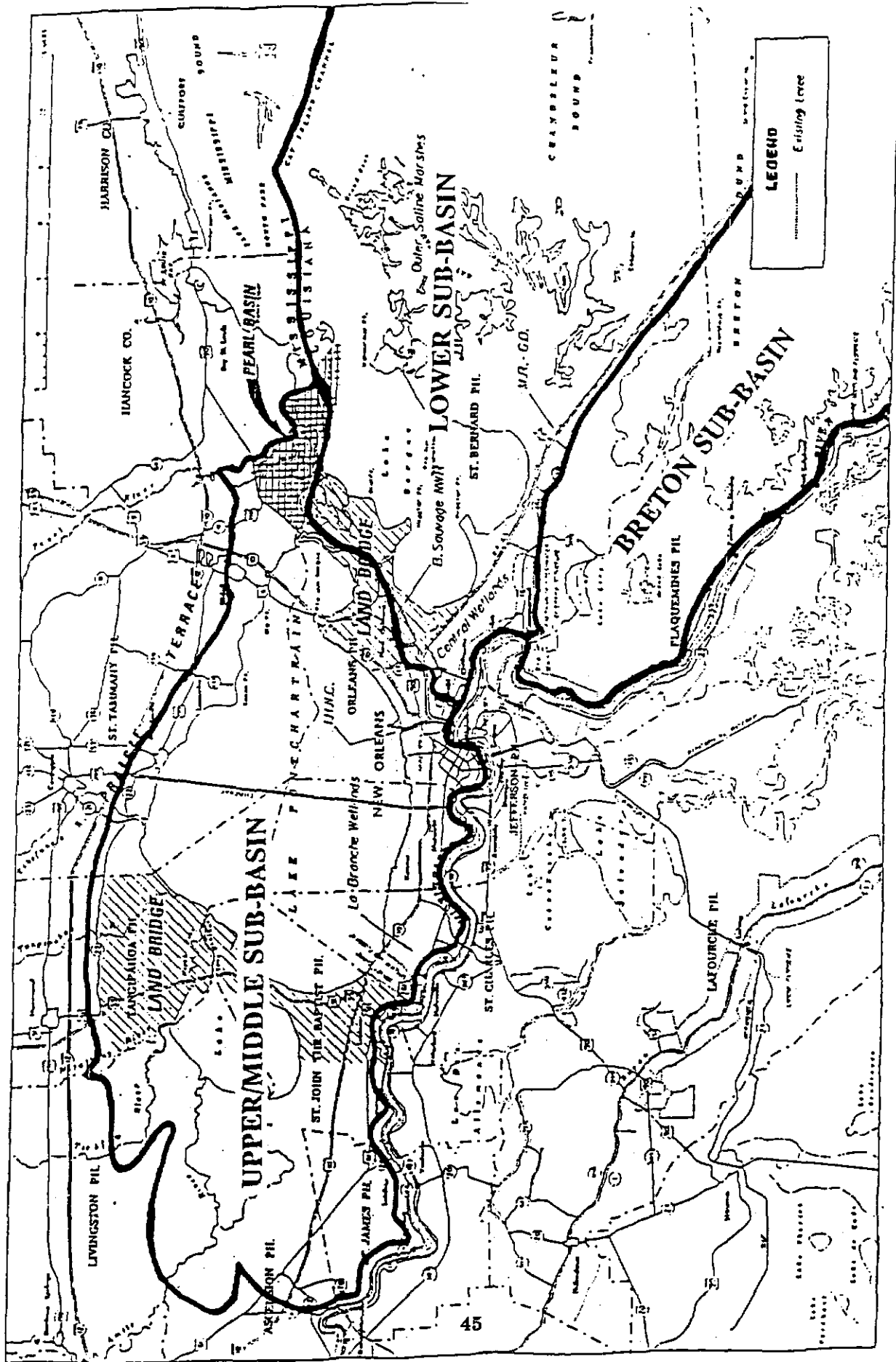


Figure 4.1 Pontchartrain Sub-Basins
Sub-Basin Boundaries

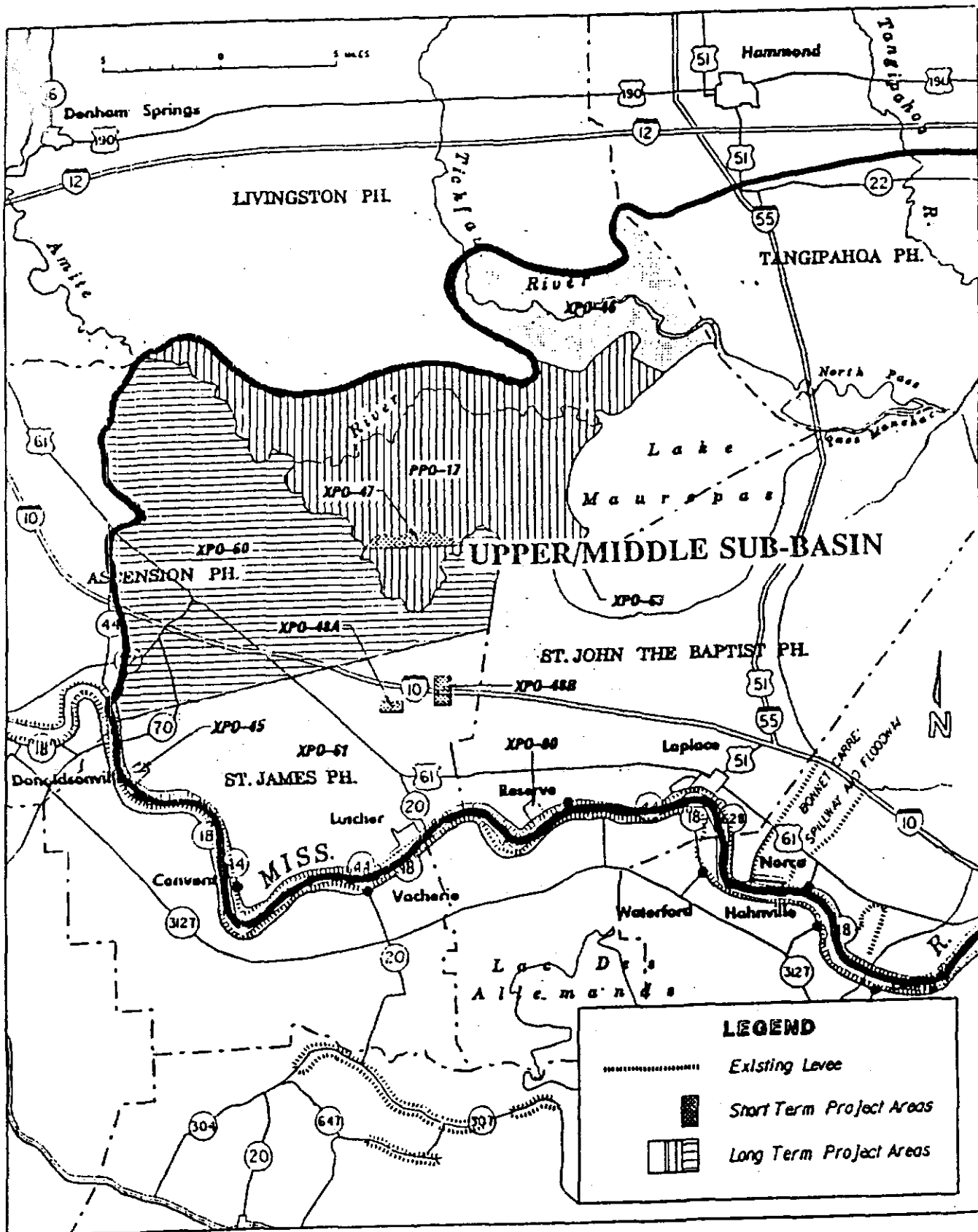
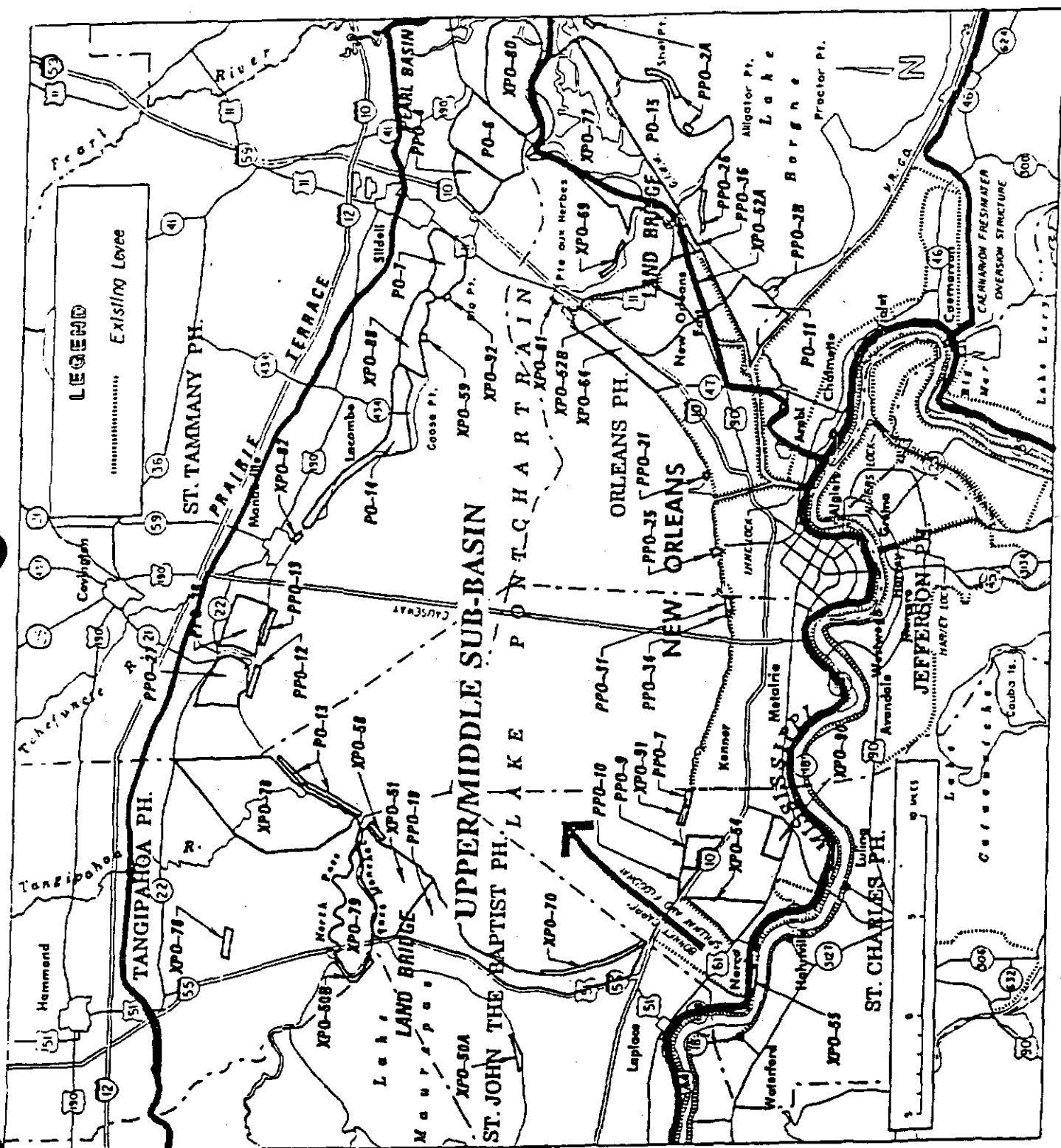


Figure 4.2 Upper/Middle Sub-Basin
Project Locations



were used to estimate wetland loss. As pointed out in the introduction, quantification of wetland loss is more straightforward than saltwater intrusion and is therefore emphasized in the problem statement.

Specific projects related to saltwater intrusion or wetland loss which were summarized in Phase II were inventoried and evaluated by the SIWLC.

Upper/Middle Sub-Basin Problem Statement

1. General Setting

The Upper/Middle Sub-Basin has important distinctions from the other sub-basins. The physical setting is dominated by swamps and marshes bordering major inland waterbodies - Lakes Pontchartrain and Maurepas. These marshes are fresher and have relatively lower wetland loss rates than the other sub-basins. To the average Basin user this estuary is a natural resource to be preserved and used primarily for recreation. To commercial and recreational fisherman, fishing is of significant value. To real estate developers a clean Lake and a protected habitat has commercial value. Recreation, public health and quality of life are perceived as being of great value to the overall community and deserve high consideration in all activities within the Upper/Middle Basin.

All four CMP Phase I public meetings were held in the Upper/Middle Basin and so are considered to be representative of the Upper/Middle Basin users rather than the other sub-basins. In general the public tended to consider the Basin major problem's as being institutional in nature and targeted the lack of inter-agency coordination or enforcement. This suggests that the public's perception is that technical solutions are available, but are hindered by institutional inadequacies. The committee recognized the institutional problems but also considers that there are outstanding technical problems to solving wetland loss or saltwater intrusion within all the sub-basins. The Coastal Wetlands Planning, Protection, & Restoration Act (CWPPRA) process itself is the major effort to overcome institutional problems. Therefore SIWLC has utilized the project planning and nomenclature of CWPPRA and recommends the LPBF continue to work within this framework. The committee does recognize significant technical problems with many potential wetland projects and has attempted to evaluate their technical merit.

2. Wetland Loss Rates

The overall land loss rate in the Upper/Middle Basin has decreased significantly recently. The rate peaked between the 1958 to 1974 period at approximately 1.32 sq. mi/yr. Since then, the rate has decreased to approximately 0.58 sq. mi/yr in 1990. The main reason for this decrease in the overall rate is the decrease in interior marsh loss in the Middle Basin.

Long-term relative subsidence rates in the Upper/Middle Basin average approximately 0.4 feet per century. This is mainly due to the relatively shallow depth of the Pleistocene surface in this area of the coast. The Pleistocene represents the most stable surface in south Louisiana with regards to subsidence.

3. Major Causes of Wetland Loss

The dominant causes of loss in the Upper/Middle Basin have been identified by the Louisiana Coastal Wetlands Conservation and Restoration Task Force and the SIWLC of the Pontchartrain Basin Comprehensive Management Plan. Alterations to the natural surface hydrology, shoreline erosion, and direct man-made loss appear to account for most of the loss experienced in the Upper/Middle Basin. In most instances, saltwater intrusion, and the resulting change in wetland habitats, is a result of alterations to the natural hydrology.

4. Altered Hydrology

Alterations to the natural hydrology impact the Upper/Middle Basin in two ways. One is through increased salinities and tidal exchange. The Mississippi River Gulf Outlet (MRGO) allows saline waters to enter Lake Pontchartrain through the Inner Harbor Navigational Canal/Industrial Canal (IHNC) introducing higher salinity into historically fresh and brackish water swamps and marshes. Increased saltwater in Lake Pontchartrain has stressed vegetation surrounding the Lake. The IHNC now supplies 8-10% of flow into Lake Pontchartrain (Stone, 1980). Although the net increase of flow resulting from the MRGO is probably less than the 8-10% of the total flow from

IHNC into the Lake, the impact of this saltwater intrusion has caused significant vegetation loss in the adjacent marshes and swamps.

A second impact occurs in areas where man-made canals, levees, and roads in combination with natural features have restricted the surface drainage and tidal exchange resulting in impoundments or semi-impoundments. These impoundments retard movement of water out of the marshes; especially after heavy rains or flood events, leading to a relative rise in water levels. They also restrict flow into the marsh, blocking nutrients and water during drier periods. If the water surface elevation is lowered (naturally or artificially) for an extended period of time, the upper organic zone can be dewatered and oxidized resulting in a loss of surface elevation or subsidence. The result will be a relative rise in water level. The effects of saltwater intrusion are increased when saline waters from storm surges or abnormally high tides get into the marshes and are retained longer due to the restricted drainage. The overall increase in relative water levels within these impounded areas also increases the physical removal of material by wave and current action because more surface area is exposed to erosion.

Several areas of interior marsh loss in the Upper/Middle Basin are largely the result of altered hydrology. One such area is located south of Lacombe in the vicinity of Goose Point. The Pleistocene Terrace on the north, the elevated shoreline along Lake Pontchartrain on the west and south, and the roads, levees, and man-made and natural canals within these boundaries combine to create an impounded or semi-impounded setting. Another area, Fritchie Marsh, is bounded by the Pleistocene Terrace on the north, Highway 433 on the west and south, and Highway 90 on the east. A third area which can be characterized as having altered surface hydrology is located north and south of Bayou Sauvage. Numerous roads, levees, canals, and the Louisville and Nashville Railroad tracks all combine to alter the surface hydrology in this area, leading to land loss. Another area is located on the south side of the La Branche Wetlands. The Illinois Central Gulf Railroad and the Interstate 10 borrow areas act to impound the wetlands located to the south. These wetlands traditionally drained to the north.

5. Shoreline Erosion

Because so much of the land area in the Upper/Middle Basin is exposed to wave and current action from large bodies of water, shoreline erosion is a major cause of loss. Areas where shoreline erosion has been especially severe include:

- The south shore of Lake Maurepas,
- The shoreline north and south of Pass Manchac in Lake Pontchartrain,
- The southwest shoreline of Lake Pontchartrain,
- the shoreline of Lake Pontchartrain just west of Chef Menteur Pass, and
- Goose Point on the north shore of Lake Pontchartrain.

Sites where future loss is likely to accelerate include areas where the eroding Lake shorelines have or will likely intersect isolated ponds and small lakes. This allows waves and currents from the large lakes to act directly on previously protected interior marshes. This has or will likely occur near Point aux Herbes in Lake Pontchartrain, in the vicinity of Goose Point, and about four miles south of Pass Manchac.

6. Direct Man-made Loss

Loss from dredging accounted for approximately 16 percent of the total land loss in the Upper/Middle Basin from 1932 to 1990. Most of this loss occurred prior to 1974. The rate of loss from dredging will probably continue to decrease. (See comment, Appendix A, Letter 1.)

Lower Sub-Basin Problem Statement

1. General Setting

The physical setting of the Lower Sub-Basin is one of major bays or sounds defined by isolated marshes or transgressing barrier islands. The majority of marshes are on an abandoned deltaic plain without a natural source of sediment. Economically feasible engineered sources of sediment are limited. A major man-made physical property of the Lower Sub-Basin is the Mississippi River-Gulf Outlet (MRGO), a hydraulically unrestricted channel which cuts the entire Sub-Basin and links the major water bodies. The effects of the MRGO constitute the major environmental problems in the Lower-Sub-Basin.

The following problems are commonly attributed to the MRGO:

- Wetland loss
- Salt water intrusion
- Declining natural hurricane protection
- Loss of fresh water species and habitat
- Declining fisheries
- Declining economic base

Complicating these problems is the additional economic impacts of port facilities which the MRGO serves. If the MRGO were to be closed, alternative shipping routes should be developed. Therefore a key to "fixing" the MRGO may require a regional shipping/port development plan. This development should involve local, state, and Federal agencies, the shipping industry, business community, and the public. This group should be encouraged to develop a regional port and shipping master plan which is consistent with the CWPPRA and CMP Phase III projects and planning. Planning should include all parties/shareholders involved so future projects will not be jeopardized by lack of complete institutional support.

The area's economic base is also composed of commercial fishing and service support for recreational fishing. The typical Lower Sub-Basin user views the estuary as an economic resource upon which their communities are dependent. Loss of wetlands equates to losses in their livelihoods, their economic foundations and ultimately to their cultural heritage. These economic factors deserve high consideration in all activities planned for the Lower Sub-Basin. (See comment, Appendix A, Letter 1.)

2. Wetland Loss Rates

Land loss rates in the Lower Sub-Basin peaked at a rate of 1.72 sq mi/yr in the 1958 to 1974 period. Before that, in the 1932 to 1958 period, they were at a low of 0.90 sq mi/yr. After the peak period of 1958 to 1974, land loss rates declined to a rate of 1.61 sq mi/yr during the 1974 to 1983

period. Land loss rates declined even further in the 1983 to 1990 period to a rate of 1.14 sq mi/yr. (See comment, Appendix A, Letter I.)

3. Major Causes of Wetland Loss

The dominant causes of land loss in the Lower Sub-Basin have been identified as:

- alterations to the natural surface hydrology,
- saltwater intrusion,
- shoreline erosion,
- dredging, and
- subsidence.

These causes appear to account for most of the loss experienced since 1932.

4. Altered Surface Hydrology and Saltwater Intrusion

Increased salinity caused by altered hydrology is a critical problem in the Lower and Middle Sub-Basins. The natural salinity balance has changed for four major reasons:

- 1) Mississippi River levees prevent the fluvial processes which once brought freshwater into the basins;
- 2) the MRGO breaches the Bayou La Loutre ridge and the Pontchartrain/Borgne land bridge which allows saline water to push further into the Basin;
- 3) subsidence/sea level rise causes a relative rise of up to 0.96 ft/century giving saltier water further access to Basin wetlands;
- 4) between 1948 and 1970, approximately five square miles of canals and channels were dredged in the Basin providing more avenues for inflow.

Thirty years ago, the elevated salinity, resulting from dredging the MRGO, destroyed all the swamp in the Lower Sub-Basin, caused the loss of over 4,000 acres of marsh, and converted over 30,000 acres of marsh to a more saline type. Mean monthly salinities throughout the area have increased since construction of the MRGO and other canals. Tidal flow in wetlands adjacent to the

MRGO have increased. Although, there are more days of high salinities now, mean increases are less than the overall salinity variability.

Roadways and levees along canals often cause impoundment or semi-impoundment by prohibiting the natural sheet flow of water. This can cause either abnormal retention of water or in some cases a deprivation of inflow. Areas that have experienced high rates of interior marsh loss, probably due to altered hydrology, include the areas north and south of Bayou Savage and the areas north and south of Bayou Bienvenue between the Gulf Intracoastal Waterway (GIWW) and the Mississippi River.

Historically, the dredging of canals through freshwater swamp and marsh in the Lower Sub-Basin disturbed the natural impoundment of these habitats by old distributary channel ridges. Cuts through these ridges typically resulted in drainage of freshwater, invasion by saltwater and the destruction of freshwater vegetation, and subsequent erosion by tidal flux. Freshwater swamp and marsh then either converted to more saline type marsh or became open water.

5. Shoreline Erosion

Shoreline erosion, another major problem of the Lower Sub-Basin, is a dominant cause of wetland losses. These losses, however, are mostly naturally occurring and are part of the life cycle of a deltaic system. Most of the land in the Lower Sub-Basin was deposited by the now abandoned St. Bernard Delta. The natural processes of relative subsidence, relative sea level rise, wave action, and tidal flux have continually deteriorated and cut back land that was deposited when the delta was active. Land-building depositional processes are no longer occurring in this area and therefore do not counteract the erosional processes.

Unprotected marshes in the outer reaches of the Lower Sub-Basin are among the most affected by shoreline erosion. Erosion rates in these areas often reach five to ten feet per year. Outer areas suffering from high erosional rates include La Petit Pass Island, Grand Island, and Isle Au Pitre in Mississippi Sound, and Deer Point, Brush, Martin, and Comfort Islands, and Mitchell Key in

Chandeleur Sound. The shorelines of Breton and Chandeleur Sounds receive the highest energy waves, and land loss rates will probably remain relatively high in these areas. Outer areas where land loss rates have been relatively low but may increase in the near future include those areas where eroding shorelines have intersected or will likely intersect smaller interior bodies of water. This is currently occurring in the numerous lakes and small bays of the marshes adjacent to Mississippi and Chandeleur Sounds.

Lake Borgne also exhibits serious shoreline erosion problems. Areas where erosion rates have been especially high include Alligator, Shell, and Proctor Points and Point aux Marchettes, and the southeast and southwest shorelines of the Lake. At Proctor Point, the eroding shoreline will likely intersect ponds and lakes of previously protected interior marshes, and erosion rates will probably increase in this area. Erosion rates along the shoreline of Lake Borgne will probably remain relatively high.

Ship traffic in the MRGO is another major contributor to erosion in the Lower Sub-Basin. Flushing action from ship wakes and tidal exchange have gradually eroded away the unprotected north bank of the channel. Approximately 15 feet of bank are eroded each year. The channel has increased in width from 750 feet in 1968 to 1000-1500 feet at the present. Approximately 69 acres of marsh are lost each year, with a total of 1,700 acres lost since 1968.

6. Direct Man-Made Loss

Loss from dredging accounted for approximately 17 percent of the total land loss in the Lower Pontchartrain Basin from 1932 to 1990. Most of this loss occurred prior to 1974. Rates of loss from dredging related activities will probably continue to decrease. Sites where direct man-made loss has been relatively high include the MRGO and the GIWW. (See comment, Appendix A, Letter 1.)

Breton Sub-Basin Problem Statement

1. General Setting

The Breton Sub-Basin is the only sub-basin which is an active deltaic plain. However, natural processes such as overbank flow from the Mississippi River have been severely restricted by levees built along the river for flood protection. Because this sub-basin is part of the active deltaic plain, it is the most accessible to the Mississippi River for future fresh water or sediment diversions.

Basin users view the estuary as an economic base. Commercial fishing and a service base for recreational fishing provide its primary economic use. As in the Lower Sub-Basin, loss of wetlands equates to a loss of livelihoods, economic foundation and cultural heritage. Potential impact to these economic activities deserve high consideration in all planning for the Basin.

A prime example of the sensitive nature of wetland projects is the current dilemma of the Caernarvon freshwater diversion. In December 1993, the diversion was operated at maximum capacity for three months. During that period fecal coliform levels rose dramatically. Consequently the area closed to oyster harvesting was expanded. Currently there is a \$100 million suit being litigated as a result of an apparent link of the Caernarvon diversion to closure of certain oyster fishing grounds. This matter is currently being investigated by the state and the Plaquemines Water Quality office. The technical and legal conclusions of this fecal coliform event, and the overall success of the Caernarvon diversion should be closely monitored. The results from the Caernarvon diversion should serve as a model for the design and operation of other diversions in the Lake Pontchartrain Basin.

2. Wetland Loss Rates

The overall trend of land loss in the Breton Sub-Basin since 1932 has been one of increasing rates. The land loss rate increased from 0.48 sq mi/yr during the 1932 to 1958 period to 1.43 sq mi/yr during the 1983 to 1990 period. The percentage of land being lost has also been increasing to approximately 0.49 percent per year during the 1983 to 1990 period. By 1990, the Breton Sub-Basin had lost approximately 16 percent of the land area present in 1932.

3. Major Causes of Wetland Loss

The dominant causes of loss in the Breton Sub-Basin have been identified as shoreline erosion, alterations to the natural surface hydrology, dredging of canals, and subsidence. These man-made actions and natural occurrences appear to account for most of the loss experienced in this Basin since 1932.

4. Shoreline Erosion

The main cause of wetland loss in the Breton Sub-Basin is shoreline erosion due to wave and current action. The Breton barrier islands are so far offshore that they provide little protection to the estuary behind them. Along the shoreline of the outer marshes erosion rates of 5 to 10 feet per year are common. Shoreline erosion has been especially severe wherever the shoreline protrudes into open water areas. Some areas where shoreline erosion rates are highest include the southern and eastern shore of Lake Lery, the southeastern shore of Grand Lake, all of the islands located in Black Bay and Breton Sound, California and Spanish Points near California Bay, and Sable Island, Raccoon, Fort, Coquille, and Deepwater Points, and Bird Island adjacent to Breton Sound.

Sites where shoreline erosion is likely to increase include areas where eroding Lake or bay shorelines intersect isolated ponds or lakes in the adjacent marshes. This allows waves and currents from the larger lakes and bays to act directly on previously protected interior marshes. Grand Lake and Lake Petit located in the central portion of the sub-basin are examples of this situation.

5. Altered Surface Hydrology

A dense network of canals has been dredged across the abandoned distributary ridges running from the Mississippi River into the upper portion of the Breton Sub-Basin. In many cases this has allowed channelized outflow of fresh water and increased tidal flux. Much of the fresh and intermediate marsh in the northern portion of the Breton Sub-Basin has either converted to more saline types or become open water. In other instances the spoil banks bordering the dredged canals create restrictions to surface drainage and tidal exchange resulting in impoundments or semi-impoundments. This causes prolonged periods of elevated water levels and in some instances,

unnaturally low water levels. The negative effects of saltwater intrusion are increased by alterations to the hydrology. High tides that enter these areas remain for longer periods due to the restricted drainage, increasing the negative impacts on historically fresh and brackish marshes. Several areas of interior marsh loss in this sub-basin are the result of alterations to the surface hydrology.

One area which can be characterized as having altered hydrology is located about 2 miles east and parallel to the Mississippi River between Braithwaite and Bertrandville. Man-made canals and levees in combination with natural levees associated with abandoned distributaries are responsible for creating an impounded or semi-impounded setting in this area. Historically, this area drained from the Mississippi River southeastward. Many of the canals dredged in this area are perpendicular to the natural drainage creating impoundments or semi-impoundments, which have resulted in marsh loss.

Another area where altered hydrology appears responsible for marsh loss is located about 2 miles north and parallel to the Mississippi River near Nero. This area is bounded by the natural levees of Bayou LaCroix on the north and an unnamed abandoned distributary on the south. Horse Power Canal on the west and another man-made canal perpendicular to the abandoned distributaries on the north and south combine to form an impounded to semi-impounded setting.

5. Direct Man-Made Loss

Loss from dredging accounted for approximately 17 percent of the total loss in Breton Sub-Basin from 1932 to 1990. Most of this loss occurred prior to 1974. Loss from dredging related activities will probably continue to decrease. (See comment, Appendix A, Letter 1.)

6. Relative Subsidence

Marsh loss due to relative subsidence is especially high in the southeastern portion of the Breton Sub-Basin near the Mississippi River. This area is characterized by a thick sequence of unconsolidated sediments with relative subsidence rates of up to 3.2 ft/century. Since Mississippi River sediments have been virtually eliminated, marsh accretion is unable to keep pace with relative subsidence, resulting in land loss.

4.2 RESPONSIBILITY (Agencies/Groups)

Entire Pontchartrain Basin:

- Dept. of Environmental Quality
 - Office of Legal Affairs and Radiation Program
- Dept. of Natural Resources
 - Coastal Management Division
 - Coastal Restoration Division
 - Office of Conservation
- Dept. of Wildlife and Fisheries
 - Scenic Streams
 - Office of Fisheries
 - Office of Wildlife
- US Army Corps of Engineers
- Environmental Protection Agency
 - Office of Federal Activities
 - Water Quality Management Division
- US Coast Guard
- Federal Emergency Management Agency
- National Marine Fisheries Services
- Council on Environmental Quality
- Office of Coastal Resource Management
- US Fish and Wildlife Service
- State Lands Office

Upper/Middle Sub-Basin:

- Department of Transportation and Development
- Orleans Levee District
- New Orleans Dock Board
- Consolidated Farm Service Authority
- Natural Resources Conservation Service (NRCS - formerly Soil Conservation Service)
- St. Tammany Parish
- Tangipahoa Parish
- Jefferson Parish
- St. Charles Parish
- Orleans Parish
- St. John the Baptist Parish

Lower Sub-Basin:

- St. Bernard Parish

New Orleans Dock Board

Breton Sub-Basin:

Department of Transportation and Development
New Orleans Dock Board
Plaquemines Parish

4.3 ALTERNATIVE SOLUTIONS (Projects/Managements)

The SIWLC investigated many alternative solutions (inventoried projects) to address saltwater intrusion and wetland loss. Many of these solutions seem to have potential positive outcomes in theory, but very often complications may arise due to implementation or degree of certainty of results. Due to the degree of certainty/uncertainty of results/benefits, projects recommended for consideration by the SIWLC for each of the sub-basins are categorized as recommended for either active or condition support for implementation. (See comment, Appendix A, Letter 1.)

Upper/Middle Sub-Basin

1. Shoreline Protection

Shoreline erosion is a major cause of wetland loss in the Upper/Middle Sub-Basin. However historical erosion rates are relatively constant and for the most part the shoreline erosion is part of the natural development of so called "round lakes" in an estuarine environment. In fact, the natural transgressive beaches seem to be the preferred site for Submerged Aquatic Vegetation (SAV) beds in open water. Shorelines stabilized by armoring seem to be detrimental to SAV beds (Poirrier, pers. comm.). The areas of highest shoreline erosion generally have extensive wetlands behind the beach, and therefore are not an immediate threat for a "blowout". Because of the uncertain technology of shoreline protection and possible detrimental effects, only those project sites which posed accelerated wetland loss were chosen for active support. Generally these were projects where nearby open lagoons threatening blowout of the adjacent marsh. The SIWLC also endorses pilot projects which would place armoring off the beach, and leave a protected lagoon between the structure and the beach. New technologies are being developed to preserve a natural habitat of the beach (Gagliano,

pers. comm.). Beach replenishment is another option which has not been proposed, but should be evaluated.

The SIWLC recommends that the following projects be actively supported for implementation:

XPO-50a	Lake Maurepas Shore Protection, Blayhut Canal
XPO-58	Pass Manchac Shore Protection, Immediately south of Pass Manchac
PPO-12	Tchefuncte Marsh Shore Protection, west side
XPO-92	Shoreline Protection Measures, Bayou Liberty mouth
XPO-91	Shore 1 mile east of LaBranche project
XPO-69	Bayou Sauvage NWR, B. Chevee Shore Protection
XPO-81	Pointe aux Herbes Shore Protection
Ongoing	Project at west end of Lake Pontchartrain 4 miles SW of Pass Manchac

Conditional support was given to projects which have high erosion rates without potential blowout. The primary condition for support being successful shoreline stabilization without typical detrimental problems such as loss of SAV or other natural habitat.

The SIWLC recommends that the following projects be conditionally supported for implementation:

XPO-50b	Lake Maurepas Shore Protection, W. Jones Is.
XPO-63	Lake Maurepas Shore Protection, Mouth of Blind R.
XPO-70	Lake Pontchartrain Shore Protection, B. C. to Ruddock
XPO-91	La Branche Shore Protection, Walker Canal to Blowhole
PO-14	Green Point/Goose Point Marsh Restoration
XPO-82	Fontainebleau Shore Protection
PPO-13	Bayou Chinchuba Marsh Shore Protection
PO-13	Shore west end of Lake Pontchartrain north of Pass Manchac

2. Hydrologic Restoration

All four hydrologic restoration projects recommended for active support are intended to increase hydrologic flow and interchange of the swamps around the southern rim of Lake Maurepas. It was concluded by the SIWLC that this general area was regionally semi-impounded due to cultural developments such as railroads and highways. These projects take maximum advantage of existing water control and thus costs are relatively low.

The SIWLC recommends that the following projects be actively supported for implementation:

XPO-47	Amite River Diversion Canal Bank Modification
XPO-48b	Hope Canal Bank Modification
XPO-48a	Tennessee Williams Canal Bank Modification
PPO-19	Highway 51/RR Culverts

3. Artificial reefs

The only artificial reef project evaluated had been previously proposed in 1994 by John Lopez at a public CWPPRA planning meeting held in New Orleans. This project is not strictly wetland restoration but is intended to simulate the protective cover for SAV beds. The project would probably enhance fisheries and species diversity. The location of the project is along the SE shore of Lake Pontchartrain where SAV beds are unlikely to be re-established. The project is unique and of relatively small cost.

(NOTE: In the spring of 1995, after this report was written, this project was accepted as a part of the CWPPRA restoration plan.)

The SIWLC recommends that the following project be actively supported for implementation:

Artificial Reef, southeast shore, Lake Pontchartrain

4. Freshwater Diversions

Seven freshwater diversions have been proposed in the Upper/Middle Sub-Basin. Since the proposed Bonnet Carre' diversion project is being reanalyzed, only six of the proposed diversions were evaluated by the SIWLC. Of these six, two would enter from the south being diverted from the Mississippi River. The remaining diversions are along the smaller rivers on the north shore.

4.1 Mississippi River Diversions

XPO-89 "Blind River Freshwater Diversion" is a proposed 9,000 cfs freshwater diversion from the Mississippi River near Garyville through the Blind River into Lake Maurepas. The SIWLC gives conditional support to this freshwater diversion project. In concept the project could have significant positive benefit to the lower Maurepas Basin due to its semi-impounded nature. These swamps need nutrients and increased circulation. For the same reasons, active support is given to several hydrologic restoration projects in this basin. Before full support can be given for the diversion a broader plan integrating inter-related projects should be developed.

A freshwater diversion has been proposed at the site of the IHNC locks at the Mississippi River. These locks were built in 1923, and will probably be re-built in the next 20 years. It has been suggested that the new locks could also incorporate a freshwater diversion structure. Such a structure is an engineering challenge, and would incur significantly higher cost. In addition, the larger area needed for re-building just the locks has created local residential opposition to the project. Nevertheless the overriding reason the SIWLC does not support this project is the SIWLC's position that the MRGO should be closed and container facilities should be moved to the Mississippi River. If the MRGO is closed, salinities may be reduced sufficiently without an additional diversion in the Upper/Middle Basin. The SIWLC committee made the assumption that some "scaled down" version

of the Bonnet Carre' diversion project is likely to be eventually developed from the ongoing reanalysis of the original design. (See comment, Appendix A, Letter 2.)

4.2 Sediment Diversions

One sediment diversion project proposes pumping of a muddy slurry from the Mississippi River into nearby swamps off the natural levee. PPO-43 "Upper Middle Basin Sediment Pumping" is located on the Mississippi River between Kenner and Whitehall. This project could have merit; however there is negligible wetland creation, and cost would be high for a small area. The unique aspect of the project is that it could restore rare hardwood ridge environments.

The SIWLC recommends that the following project be conditionally supported for implementation:

PP0-43 Upper Middle Basin Sediment Pumping

5. Marsh Creation

Two marsh creation projects have been proposed, and in both cases these constructed wetlands are intended as water treatment for stormwater drainage from the south shore. One project is an ongoing project proposed by the Lake Pontchartrain Basin Foundation for the south shore and was given active support. The other project has been proposed by the Orleans Levee District as part of a larger barrier island development. Although the Orleans Levee District's constructed wetlands concept warrants support, the overall project is opposed due to concern with the other components of the project. In particular the source and nature of fill material and impacts to the Lake bottom are critical issues. (See comments, Appendix A, Letters 1 & 3.)

The SIWLC recommends that the following project be actively supported for implementation:

Pontchartrain Stormwater/Wetlands

(NOTE: Since this section was written, the project has been moved to St. Bernard Parish.)

Lower Sub-Basin

1. Shoreline Protection

Eight shoreline protection projects have been proposed around the shoreline perimeter of Lake Borgne. As was pointed out previously, shoreline protection is not a well developed technology. Three shoreline protection projects are proposed on the east shore of Lake Borgne. Wetland loss on this shore is relatively low and there is no immediate threat of marsh blowout. One of these projects is actively supported since it is potentially a significant pilot project to test oyster reefs as a shoreline stabilization method.

The SIWLC recommends that the following project be actively supported for implementation:

XPO-65 Artificial Oyster Reefs

Five projects are located on the northwest and southwest shores where there is a narrow band of marsh separating Lake Borgne from the MRGO and the GIWW. These projects deserve high priority, but must be developed into a unified plan for shoreline stabilization and environmental preservation. Alternative approaches to simply placing rip-rap on the beach, should be evaluated. Offshore structures, beach replenishment, and oyster reefs are several alternatives that could be evaluated.

The SIWLC recommends that the following projects be conditionally supported for implementation:

PPO-2c	Lake Borgne Shore Protection, Proctor Point
PPO-2d	Lake Borgne Shore Protection, E. of Shell Beach
PPO-2a	Lake Borgne Shore Protect., Rigolets to Chef
PPO-2b	Lake Borgne Shore Protection, south of Bienvenue
PPO-2g	Lake Borgne Shore Protect., Chef to GIWW Bypass

2. Major Hydrologic Barrier - MRGO/IHNC

Several major projects have been proposed to offset the detrimental impact associated with the MRGO. Three major detrimental impacts were recognized:

- 1) increased salinity
- 2) wave erosion associated with the channel
- 3) economic loss to St. Bernard due to loss of wetland resources

The SIWLC weighed the pros and cons of four alternatives. The committee ultimately chose the alternative that was considered most overall beneficial to the wetlands. It was assumed that there was a reasonable probability that a "scaled down" version of the Bonnet Carre' diversion would ultimately be built.

The Inner Harbor Navigational Channel (IHNC) alternatives considered were:

- 1) Sill at entrance to Lake Pontchartrain
- 2) Freshwater diversion at Mississippi River locks

A sill is low cost, but it would not reduce saltwater intrusion into the Lower Sub-Basin and would have no effect on MRGO bank erosion. As it would not benefit the Lower Sub-Basin, it was not supported. A freshwater diversion incorporated into new locks at the IHNC locks would be very expensive and an engineering challenge. Local residential opposition has grown since additional land would be required to construct new locks. A freshwater diversion would require even more land. A diversion would help both the Upper/Middle and Lower Sub-Basins, but would not reduce bank erosion on the MRGO and thus was not supported.

MRGO alternatives considered were:

- 1) Gate the MRGO at Bayou LaLoutre
- 2) Closing the MRGO at Bayou LaLoutre

The purpose of a gate on the MRGO would be to allow commercial shipping (deep draft vessels) to continue to use the MRGO. A gate would reduce salinities in both the Upper/Middle and Lower Sub-Basins. Such structure could be very expensive and would not stop bank erosion on the MRGO. Furthermore, construction of this expensive structure would commit the MRGO as a major commercial shipping lane and could stimulate other activities which could conflict with wetlands management. Thus, the SIWLC felt, from an environmental perspective, ultimately the best place for commercial shipping is the Mississippi River where it has traditionally operated and will continue to operate for the foreseeable future.

Closing the MRGO with a dam is significantly less expensive than a gated structure, and would significantly reduce saltwater intrusion in both Sub-basins. Since commercial shipping on the MRGO would relocate, bank erosion would be greatly reduced. However, closure of this shipping lane would eliminate access to the only available container shipping facilities in the Port of New Orleans. Although the MRGO only averages 2 ships a day, it carries a significant volume of tonnage to the Port of New Orleans. The MRGO can not be closed without an alternative shipping route for container vessels. The LPBF and others should encourage the dock boards and/or port authorities from Orleans, St. Bernard and Plaquemines Parishes to participate in the planning so that not only is the current conflict of basin management resolved, but also so future expensive conflicts are avoided. The best alternative for the wetlands is clear, close the MRGO. This is not a technical problem. It is an institutional and economic problem which can only be met by a commitment from all shareholders. The SIWLC chose this environmentally sound solution and actively supports closing the MRGO with a dam, and relocation of existing container facilities to the Mississippi River. It is recognized that relocation of these facilities is expensive, but this move has the potential to re-establish regional commercial infrastructure with less basin management conflict and less overall cost in the future.

In summary, closing the MRGO with a dam is believed less expensive in the long-run than other alternatives and addresses all three significant problems associated with the MRGO.

- 1) Salt water intrusion would be greatly reduced.

- 2) Wave erosion in the MRGO would be drastically reduced.
- 3) Container port facilities on the Mississippi River in St. Bernard could provide economic benefits to St. Bernard Parish.

The SIWLC recommends that the following project be actively supported for implementation:

Closing the MRGO at Bayou LaLoutre

3. Hydrologic Restoration

Eight hydrologic restoration projects are proposed in the Lower Sub-Basin. Many of these projects would be within interior marshes where wetland loss is relatively low. Existing wetlands do not appear to be under immediate threat.

"XPO-71 MRGO Disposal Area Marsh Protection" is a low cost project and should preserve a rare freshwater marsh in the Lower Sub-Basin. Presently, the area is suffering from impoundment.

The SIWLC recommends that the following project be actively supported for implementation:

XPO-71 MRGO Disposal Area Marsh Protection

4. Marsh Creation

Ten marsh creation projects are proposed within the marsh adjacent to the MRGO. These projects beneficially use MRGO dredged material to replenish nearby critical areas experiencing wetland loss. Until the MRGO is closed, this is probably the best use of dredged material from channel maintenance.

The SIWLC recommends that the following project be actively supported for implementation:

XPO-72 MRGO Marsh Creation (material 9-23 to jetties)

XPO-83	Lake Athanasio Spit Marsh Creation
PPO-38	(six locations along the MRGO)
YPO-74	Bienvenue Outfall Management and Marsh Creation

5. Hydrologic Modification

One hydrologic modification project has been proposed to maximize benefits of the existing Violet siphon. Freshwater flow is to be altered so that freshwater is routed across the marsh rather than channelized through it.

The SIWLC recommends that the following project be actively supported for implementation:

Routing Violet flows

Breton Sub-Basin

1. Freshwater/River/Sediment Diversions

Five diversions have been proposed in the Breton Sub-Basin. The Caernarvon diversion is complete and was operated at full capacity over the winter of 1993-1994. Fecal Coliform levels were reported to have increased dramatically over that period and resulted in extensive closure of some oyster fishing grounds. Currently there is a \$100 million suit filed against the state by oyster fishermen. As a result of the suit, the cause for the fecal coliform increase is under investigation. Another freshwater diversion (PBS-15 Scarsdale diversion) is proposed nearby. The Scarsdale diversion would make the Caernarvon diversion obsolete.

Two different scale diversion projects are proposed at Bohemia. The smaller project (PBS-7) would allow 20-50,000 cfs flow from the Mississippi River through a deep channel cut off the river into adjacent marsh (American Bay). The larger project (PBS-4) would allow 70% of the Mississippi

River flow to be diverted into Breton Sound. PBS-4 would have profound implications for the entire lower Mississippi River delta.

The SIWLC gives active support to the larger "river sediment diversion" project. To rationalize this recommendation, the SIWLC looked beyond the arbitrary boundaries of the Pontchartrain Basin. The "big picture" is that the current Mississippi River course is dumping most of its sediment load off of the continental shelf. This sediment is unavailable for the estuary and is lost forever. The only way to significantly capture this tremendous resource is to have a major diversion upriver. Two alternatives exist. A westward diversion would build delta in open water in an area of high subsidence rates. An eastward diversion builds a new delta in a shallower, more stable and protective sound. Therefore the "big picture" requires a major diversion on the lower delta and the best site appears to be the east flank of the River. From the perspective of the Pontchartrain Basin, this river diversion can not be construed as a restoration project, but is a total alteration of the historical ecology of the Breton Sub-Basin. Equally significant is the eventual abandonment of the lower birdfoot delta. The SIWLC chooses to take the regional perspective and gives active support to the river sediment diversion. However, a regional planning process should be developed to fully integrate technical and socio-economic ramifications for a major river sediment diversion at Bohemia.

One other small sediment diversion is proposed on the lower delta (PBS-6). The location of this project is a site which was an active crevasse until the river bank was stabilized. The proposed project would restore the active crevasse.

The SIWLC recommends that the following projects be actively supported for implementation:

PBS-4 Bohemia sediment diversion

PBS-6 Lower delta sediment diversion

2. Outfall Management

Five outfall management projects are proposed in the Breton Sub-Basin. Three other outfall management projects are proposed along with ongoing diversions (BS-4a at White's ditch, BS-1a/b at

Bohemia and BS-5 at Bayou Lamoque). These projects could maximize benefits of the ongoing diversions.

The SIWLC recommends that the following projects be actively supported for implementation:

BS-4a	White's ditch
BS-1a/b	Bohemia
BS-5	Bayou Lamoque

Two of these projects are designed to manage the freshwater diversion at Caernarvon (BS-3a and BS-6a/b). Support is conditional pending results of the ongoing investigation of high coliform levels in the surrounding marsh.

The SIWLC recommends that the following projects be conditionally supported for implementation:

BS-3a	Caernarvon
BS-6a/b	Caernarvon

Additional Recommendations

In addition to the projects recommended for active and conditional support, the SIWLC submits the following recommendations to address possible deficiencies perceived in current wetland loss/saltwater intrusion planning efforts.

- 1) Projects or legislation should be proposed to address nutria population increase and associated eat-outs. Aside from general suggestions in the CMP, no proposals exist to address this problem. (See comment, Appendix A, Letter 1.)

- 2) The CWPPRA process seems designed to best manage many small projects whereas some portions of the Basin are in need of more general management plans. The Bayou Sauvage Management plan is a good example of integration of many small projects into a master plan. The SIWLC has identified the following areas which require general management plans:
 - A) North shore of Lake Pontchartrain from Cane Bayou to Hwy 11 - internal and shoreline wetland loss. (The recently established Big Branch Refuge creates the framework for a master plan in this area.)
 - B) the eastern "outer marsh" of St. Bernard marsh (high shoreline erosion, possible "line of defense" position).
 - C) marsh between Mississippi River and Lake Maurepas (semi-impounded and possible sites for small diversions).
- 3) Beach replenishment is a possible solution to shoreline erosion within the lakes. This concept should be researched. Pilot projects should be implemented to test concept feasibility. The north shore of Lake Pontchartrain is a possible site.
- 4) A regional planning process should be initiated to fully integrate technical and socio-economic ramifications for a major river sediment diversion at Bohemia.
- 5) All controlling local, state, and Federal agencies, the shipping industry, and the public should be involved in planning and relocation of port facilities to accommodate closing the MRGO.

5.0 LAKE PONTCHARTRAIN BASIN FOUNDATION RECOMMENDATIONS & CONCLUSIONS

It has taken many years and a tremendous amount of energy to get the Comprehensive Management Plan to this point. The foundation of the plan was the series of public meetings where citizens shared their concerns about the problems they perceived as a threat to the very health of the Pontchartrain Basin. Just as important, citizens also presented tentative solutions to the problems. Their ideas, or solutions, were listed in the second phase of the CMP and were termed "action items." As a component of the management plan development, each item was evaluated to determine if it had the potential to improve the water quality and habitat of the Lake Pontchartrain Basin.

There were many excellent suggestions, but all of them could not be pursued. As part of the process, all were considered in a holistic context. Some of the items were not implementable because of cost concerns. Many were not adopted because of scientific concerns. Some of the items may have had a benefit for one specific area but could have caused harm to the overall health of the Basin and therefore were not selected. In the end, the process worked. Many of the citizens' ideas have been implemented, and they have demonstrated measurable results.

The options put forth by Phase III committees are a continuation of the process begun years ago. The committees' work provides another opportunity to evaluate additional programs and projects to assist the Foundation in its mission. The committees' recommendations were good. They were based upon the members' experiences in natural resource management, and we have included them in their entirety. But, as with action items, all of them could not be undertaken at this time.

Following the process developed during Phase II, the Lake Pontchartrain Basin Foundation staff evaluated the various options in order to determine the projects, that in our opinion, would provide the most cost effective, environmentally acceptable improvements to the Basin's water quality and habitat.

The following recommendations represent the staff's opinions based upon our day-to-day involvement with Foundation activities, with local, state and federal agencies, and interaction with the citizens of the Basin. They are based upon the data that are now available. We believe they represent projects and programs that will put us closer to our goal of a cleaner, healthier Pontchartrain Basin. (See comment, Appendix A, Letter 1.)

5.1 SEWAGE & AGRICULTURAL RUNOFF

North Shore Specific

- Complete the Tangipahoa Parish septic tank sludge treatment plant near Amite.
- Continue the agricultural assistance program for dairy farmers and cattle ranches.
- Expand the LCES household waste education program.
- Support the UWMRC's project to evaluate individual home sewage system performance in old and new sections of St. Tammany Parish.

South Shore Specific

- Construct the LPBF pilot wetland project in St. Bernard Parish.
- Continue LPBF citizens monitoring program(s).
- Support the City of New Orleans and Orleans Sewerage and Water Board's infiltration and inflow analysis of New Orleans Lakeview Area.
- Support the Jefferson Parish Project to repair breaks in municipal sewerage lines throughout the East Bank of the parish.
- Support the UWMRC's project to evaluate procedures for detecting inappropriate or illegal discharges to stormwater drainage.
- Install pump out facilities at marinas in the Pontchartrain Basin.
- Develop and evaluate alternative sewage treatment systems for camps in the Basin.

5.2 STORMWATER

- Support the application of the EPA's "User Guide" for the elimination of inappropriate connections to the stormwater drainage system.
- Expand programs to eliminate infiltration/inflow, overflows and bypasses to the stormwater drainage system.
- Support plans to divert stormwater to treatment facilities with subsequent discharge to waterbodies with greater assimilative capacity.
- Evaluate bioremediation as a means to reduce pollution (particularly pathogens) in urban stormwater.
- Continue public education and public participation programs that increase awareness of existing programs and ordinances.
- Initiate planning and programs to reopen recreational swimming areas in Lake Pontchartrain and north shore rivers.
- Develop ordinances for sediment control at construction sites in the Florida Parishes.

5.3 SALTWATER INTRUSION/HABITAT RESTORATION

- Develop a comprehensive, holistic freshwater and sediment diversion schedule for the Pontchartrain Basin.
- Develop, and test alternatives to traditional shoreline hardening methods, e.g., stone revetments, bulkheads, sheet pile, etc. Alternatives for consideration should include offshore structures, artificial oyster reefs, beach replenishment and others.
- Develop a pilot artificial reef project for the south shore of Lake Pontchartrain.
- Close the Mississippi River Gulf Outlet.
- Initiate a regional planning process for the relocation of port facilities as a component of closing the MRGO. The effort should include local, state and federal agencies, the shipping industry and the public.

- Investigate re-routing freshwater flow from the Violet Siphon so it flows overland through surrounding marsh rather than current channelized pattern.

5.4 CONCLUSION

The restoration of the Lake Pontchartrain Basin is working. Partnerships and alliances between the public and private sectors have led to implementation of many of our targeted goals and objectives. Lessons have been learned along the way. Strategies to restore the Lake and Basin are constantly being shaped and reshaped by the intentions and commitments of those involved, tempered with social, economic, and political forces. There is a continuing evolution dependent on new data, new ideas, new coalitions, and of course, the ever changing political and economic scene. Our restoration efforts must recognize the influence of these changes and adapt our strategies to meet the challenges of the ever present dynamics. The success of our efforts is ultimately founded in the public's hard work and the confidence they place in our organization.

The Comprehensive Management Plan is a road map. We have outlined where we want to go by defining our objectives and goals. But, like any other road map, you can reach the destination by alternative routes. Any plan must be subject to constant review and scrutiny to find the best road for the dynamics of the time. The Comprehensive Management Planning process does not stop with the submittal of a final document. It must be constantly subject to critical review to find the road that ultimately leads to the preservation and restoration of the Lake Pontchartrain Basin.

APPENDIX A: COMMENTS

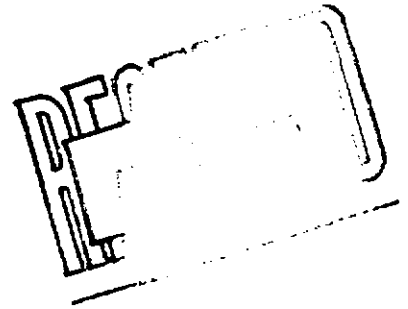
All comments submitted during the comment period for this document are included in their entirety.

All comments are referenced in the text of the document.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

July 28, 1995



Dr. Steve Gorin, Program Director
Lake Pontchartrain Basin Foundation
P.O. Box 6965
Metairie, LA 70009-6569

Dear Dr. Gorin:

We have completed our review of the draft Phase III Comprehensive Management Plan for the Lake Pontchartrain Basin. Our comments are enclosed. As we discussed in our telephone conversation on July 28, 1995, our comments are based on a "technical" review of the information presented and do not reflect any agreement or disagreement with action recommendations included.

We appreciate your continued efforts to restore and protect Lake Pontchartrain. Do not hesitate to let us know whenever you need assistance.

Sincerely yours,

A handwritten signature in cursive script that reads "Karen H. Young".

Karen H. Young
Project Officer
Grants Section, 6WQ-AG

Enclosure

COMMENTS ON DRAFT PHASE III CMP

- . Page 7, Table 2.1 indicates that the south shore of Lake Pontchartrain and the mouth of the Tchefuncte River have been restricted since 1982 for recreational uses and/or shellfish farming and harvesting. The report should discuss on what schedule subsequent sampling has been performed in all restricted areas and under what conditions these restrictions would be lifted.
- . Page 14, South Side of Basin states that plants make emergency discharges into the drainage canal system (due to excessive storm water infiltration). The report should define excessive storm water infiltration, identify the agency that approves the emergency discharge, and discuss any special conditions under which the emergency discharge is approved.
- . Page 16, Responsibility (Agencies/Groups) should include the approximate number of plants within the Basin that have been fined, rather than simply stating "a number of plants."
- . Page 16, Individual Home Systems identifies several alternative systems. The report should include a brief discussion on how long these other systems have been acceptable and their success, if known.
- . The report should clarify the statement on Page 17, Agricultural Runoff regarding the lack of management/compliance regulation from DEQ's non-point source section. The non-point source section at LDEQ has no regulatory authorities.
- . Page 18, Individual Home Systems should include a statement as to why local sewage treatment plants are no longer accepting the septate from home systems.
- . Clarify the type of funding, and from whom it will be received, referred to as "block grant" on Page 20, North Shore Specific.
- . Page 34, second paragraph states that surplus water is discharged into Lake Pontchartrain in order to maintain specific water surface elevations in Jefferson Parish. The report should include a discussion on the frequency of this activity as well as the impact the discharge has on Lake Pontchartrain.
- . Page 38, D. Eliminate direct connection of roof drains to streets should include a brief discussion as to what process will be used in order to accomplish this activity (i.e., homeowner incentives).



EDWIN W. EDWARDS
GOVERNOR

JACK McCLANAHAN
SECRETARY

DEPARTMENT OF NATURAL RESOURCES

July 3, 1995

Carlton Dufrechou
Executive Director
Lake Pontchartrain Basin Foundation
P.O. Box 6965
Metairie, LA 7009-6965

Carlton
Dear Mr. Dufrechou:

Congratulations on being so close to concluding the Comprehensive Management Plan for Lake Pontchartrain. In response to the Draft Comprehensive Management Plan III, I have some comments to make in my role as a participant for the Coastal Management Division. They are listed below as follows:

1. On page 62 the Division of State Lands is shown as being an agency within the Department of Natural Resources, which it is not. The State Lands Office is in the Division of Administration of the State of Louisiana;
2. On page 66 there is a discussion of the IHNC locks which concludes that, rather than supporting the incorporation of a freshwater diversion into the new lock structure, the SIWLC committee supports closure of the MRGO. It should be noted that the IHNC lock structure also serves to connect the Intracoastal Waterway to the Mississippi River and that the need for such a connection would not be substantially changed by a closure of the MRGO. Freshwater introduced through the new lock could have an impact on the Pontchartrain Basin, so this option should not be dismissed out of hand.
3. Page 67 lists the Lake Pontchartrain stormwater drainage project as a marsh creation project, which it is not. Discussion of this project should be limited to the section of this report dealing with stormwater runoff.

You may also be receiving comments from the Coastal Restoration Division of DNR on this draft. Best wishes in your effort to develop the CMP.

Sincerely yours,

Jim Rives
Assistant Administrator

- . Page 39, Education should include a discussion on how success will be measured.
- . Page 40, second paragraph should include DHH and DEQ as partners in the master plan.
- . If this report is intended to be a stand alone document, then a brief discussion of the Coastal Wetlands Planning, Protection, and Restoration Act process should be included.
- . Page 54, 6. Direct Man-made Loss should state why the rate of loss from dredging will probably continue to decrease.
- . The report should clarify whether or not the economic factors discussed on Page 55, 1. General Setting are unique to that particular area.
- . Page 55, 2. Wetland Loss Rates should include a brief discussion as to why land loss rates have declined.
- . Page 58, 6. Direct Man-made Loss should state why the rate of loss from dredging will probably continue to decrease.
- . Page 61, 5. Direct Man-made Loss should state why the rate of loss from dredging will probably continue to decrease.
- . Page 63, Alternative Solutions (Projects/Managements) should include a brief discussion as to how the SIWLC obtained the alternative solutions that it investigated.
- . Page 67, Marsh Creation should include more discussion on the source and nature of fill materials and the impact on the Lake Pontchartrain bottom.
- . Page 74, Additional Recommendations, number 1 refers to the increase in the nutria population and associated problems. This section should include more information on the overall problem as well as problem locations.
- . Page 76, Section 5.0 Lake Pontchartrain Basin Foundation Recommendations should include estimates as to the length of time and funds required to complete the activities identified on pages 77 and 78.



JEFFERSON PARISH
LOUISIANA

ENVIRONMENTAL & DEVELOPMENT CONTROL DEPARTMENT

MICHAEL J. YENNI
PARISH PRESIDENT

MARNIE WINTER
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B.K. SNEED
DIRECTOR

August 3, 1995

Mr. Carlton Dufrechou
Lake Pontchartrain Basin Foundation
P.O. Box 6965
Metairie, LA 70009-6965

RE: DRAFT COPY OF CMP III

Dear Mr. Dufrechou:

Thank you for the opportunity to comment on Pontchartrain's Comprehensive Management Plan. In general, the Plan looks good.

The only, minor comment I have is regarding the first paragraph on page 36 which states, "Fecal coliform counts were high in several samples indicating the presence of possible overflows, bypasses, inappropriate connections or cross connections to the sanitary sewer system." While these are some possibilities, other potential sources include warm blooded animals (pets, birds, nutria) and some common soil bacteria (see page 6, paragraph 3 of CMP III for discussion).

Thanks, again, for the opportunity to participate in this important planning process.

Sincerely,

Marnie Winter

Marnie Winter

cc: B.K. Sneed



Funding for this publication and the planning process has been made possible through a \$500,000 grant(#X-006710-01) from the U.S. Environmental Protection Agency (EPA) covering 95 percent of the costs of the project. Any opinions, findings, and conclusions in this publication are the authors' and do not necessarily reflect the views and policies of the EPA.



The Lake Pontchartrain Basin Foundation, a membership-based citizens' organization, is the public's independent voice dedicated to restoring and preserving the Lake Pontchartrain Basin. Through coordination of restoration activities, education, advocacy, monitoring of the regulatory process, and citizen action, the Lake Pontchartrain Basin Foundation works in partnership with all segments of the community to reclaim the waters of the Basin for this and future generations.

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